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The Electronic Supervisor

New Technology — New Tensions

CONGRESS OF THE UNITED STATES OFFICE OF TECHNOLOGY ASSESSMENT
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Foreword

The Electronic Supervisor: New Technology, New Tensions, deals with the use of computer-based technologies to measure how fast or how accurately employees work. New computer-based office systems are giving employers new ways to supervise job performance and control employees' use of telephones, but such systems are also controversial because they generate such detailed information about the employees they monitor. This assessment explores a broad range of questions related to the use of new technology in the workplace and its effects on privacy, civil liberties, and quality of working life.

This study was requested by the House Committee on Government Operations and the Subcommittee on Civil and Constitutional Rights of the House Committee on the Judiciary. A second report resulting from the same request, *Defending Secrets, Sharing Data: New Locks and Keys for Electronic Information*, will discuss how important developments in computer security are converging with technologies and policies for communications security. It also explores the past and future role of government policies in the evolution of information security technology—particulary cryptography—for safeguarding communication in government and the private sector.

OTA wishes to thank the many people and organizations that contributed to this assessment through advisory panels, interviews, reviews, and other means of sharing their information and experience with us. The final responsibility for the study, however, rests with OTA.

John H. Gibbons

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NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the advisory panel members. The panel does not, however, necessarily approve, disapprove, or endorse this report. OTA assumes full responsibility for the report and the accuracy of its contents.

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Summary

Introduction

Computer technology makes possible the continuous collection and analysis of management information about work performance and equipment use. This information can be useful to managers in managing resources, planning workloads, and reducing costs. It can be advantageous to employees as well, by providing timely feedback on performance and an objective basis for evaluation. Despite these possible advantages, however, there is controversy about computer-based monitoring on grounds that it invades employees' privacy, causes stress, and can be used unfairly by some employers.

Tools for Supervising Office Activities

"Computer-based monitoring" or "electronic monitoring" systems automatically record statistics about the work of employees using computer or telecommunication equipment in their jobs. Such statistics might include number of keystrokes made, types of transactions completed, or time spent for each transaction, for example.

"Service observation" refers to the practice of listening in on an employee's conversation with a customer to check on courtesy, correctness of information, or other factors. Service observation is not automatic; it requires a human supervisor. However, it is often used in conjunction with computer-based systems that collect information about the duration of the telephone call or the types of transactions the employee performs during the call. New technology has made service observation completely silent, so neither the employee nor the customer may know a supervisor is on the line.

"Telephone call accounting" refers to automatic, computer-generated records of the time, duration, and destination of telephone calls. It is generally used to manage telephone costs rather than to supervise the work process. Some employers use telephone call accounting to help reduce their employees' personal use of office telephones.

Computer-Based Work Monitoring

Computer work monitoring is affecting a small but growing segment of the office work force. It is estimated that around 6 million office workers have part or all of their work evaluation based on computer-generated statistics; for many others, such statistics may be collected but are not currently used for evaluation. The number of monitored workers can be expected to grow as computers begin to be used in more office jobs. In addition, computer work monitoring is also affecting people in non-office jobs, for example retail sales, as computers are introduced in a greater variety of workplaces.

Privacy.—Although many workers have expressed a feeling of privacy invasion when they are "constantly watched" by a machine, computer-based monitoring usually does not raise issues of privacy infringement in the strict legal sense. The workplace activities that are monitored by computer are primarily inherently public activities, many of which were subject to counting or supervision in other ways before computers became available. Privacy and access questions may arise, however, related to employees' ability to see or challenge records concerning their work.

Fairness.—The central workplace issues raised by monitoring are labor relations questions of fairness, dignity, autonomy, and control, and are greatly influenced by the labor-management relations climate of a given firm or industry. The effects of computer-based monitoring depend on how it is used. Allegations of "unfair" or "abusive" monitoring usually focus on questions like high or increasing quotas, inappropriate work standards or punitive use of monitoring information by supervisors. Computer-based monitoring appears most likely to be opposed or resented by employees when they perceive that it is used unfairly or when it is imposed without their understanding or participation. Conversely, in some workplaces employees accept electronic monitoring as a tool that helps them get control of their own work and ensures that their supervisors evaluate them on the basis of fair criteria.

Stress.—An additional issue is the possibility that monitoring contributes to employee stress by creating a feeling of being watched or by creating pressure to work at high speed. There is some research on effects of computer-based monitoring, but it generally fails to separate the effects of monitoring from those of job design, equipment design, lighting, workload, machine pacing, and other potentially stressful aspects of work in offices where computerized equipment is used. This area deserves further research.

Service Observation

Monitoring the content of messages raises a related set of issues. Some employers say that service observation (listening to or recording the content of employees' telephone conversations with customers) helps assure quality and correctness of information and protects all parties in case of dispute. However, service observation also impacts the privacy of the customer, and workers and labor organizations have argued that it contributes to stress of the employee, and creates an atmosphere of distrust. Service observation is legal when part of a formally established program of evaluation. In the Federal Government, employees must be informed that such a program is in effect, but do not need to be informed precisely when a supervisor is listening.

Telephone Call Accounting

Telephone call accounting (computer-generated records of the time, duration, destination, and cost of calls) gives employers a powerful tool for allocating costs to different projects, settling billing disputes with telephone companies, and discouraging nonbusiness use of telephones. Other technologies, including call blocking, authorization codes, and levels of service, can be used to limit nonbusiness uses of telephones, either instead of or in conjunction with call accounting.

The Federal Government has collected detailed call accounting data on long-distance calls for at least 10 years, but new technology would make this information easier for agencies to use on a regular basis. Privacy questions are raised when accounting records, which are not required to be protected, are used to track the calling habits of individuals. If call accounting is going to be used by the Federal Government, development of better guidelines on acceptable levels of personal use of telephones, procedures for tracing patterns of major abuse, and guidelines for protecting call records from unauthorized use are necessary to minimize intrusions on Federal workers.

Privacy and Fairness in the Workplace

The uses of technology discussed so far are controversial because they point out a basic tension between an employer's right to control or manage the work process and an employee's right to autonomy, dignity, and privacy. This same tension is also evident in the use of other technologies for surveillance and testing in the workplace. For example, Controversy over polygraph testing, drug testing, genetic screening, and emerging brain wave testing illustrates the tension between employers' rights to manage their enterprise, reduce costs and reduce liability, and the employees' rights to preserve individual privacy and dignity. Fairness questions relate to the accuracy of the tests themselves as well as to the criteria for deciding who is to be tested. Privacy issues include employers' acquisition of personal information not related to work, and the protection of records generated by testing.

Legal and Policy Implications

There are no legal requirements in U.S. law that monitoring be "fair," that jobs be well designed, or that employees be consulted about work standards, except insofar as these points are addressed in union contracts. Less than 20 percent of the office work force is unionized, and even where unions are involved, their effectiveness has been limited because technology choice and productivity measurement are often considered "management rights" under the contract. Similarly, workers are not currently protected by law against stressful working conditions, although stress can be a compensable injury under Worker Compensation statutes.

Chapter 1
Introduction

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Chapter 1

Introduction

BACKGROUND

This study addresses the capabilities of new computer and communication technologies for monitoring employees' activities in the workplace. New communication technologies such as digital private branch exchanges (PBXs), local area networks (LANs), and digital telephony in the switched network provide more capability to monitor calling patterns as well as content of telephone calls. Equipment and software for telephone call accounting (tracking the time, destination, and cost of calls) make up the fastest growing segment of the telecommunication industry.

The networking of computers, either through LANs or sometimes through the telephone system, provides a broad capacity to monitor work that is performed at a computer terminal. Computer-generated statistics provide the basis of part or all of the work performance evaluation for about 4 to 6 million office workers. For many millions more, computer statistics of some sort are collected every time they use their terminals, even though these records are not currently used for performance evaluation. Most of the employees subject to computer-based work measurement are in clerical occupations, or in other jobs where work is largely repetitive. Ultimately, as electronic mail and other computer-based technology become more pervasive in the office, it is likely that computer-based monitoring will affect a large number of workers at all organizational levels.

Managers say that computer-based monitoring is very useful to employers. Computer monitoring of productivity can help them enhance productivity, maintain production standards, spot bottlenecks, and plan personnel and equipment needs. "Service observation," the capability to listen in on telephone conversations between employees and customers, helps them make sure that customers receive correct information and courteous service. Telephone call accounting can be a powerful management tool for allocating telephone costs, checking the correctness of telephone bills, and reducing personal use of employers' telephones. The Federal Government, through a recent audit of call accounting records, found that about 33 percent of off-network long-distance calls on the Federal Telecommunications System were personal calls.

On the other hand, there are concerns about these practices as well. There are strong arguments that computer-based monitoring can be abused and that monitoring has potential for invasions of employee privacy, as well as assaults on their autonomy, personal dignity, and health. Computer monitoring of performance provides continuous minute-by-minute records of employee performance and could be used to speed up the pace of work or enforce unfair work standards. Service observation, when done without notice or warning, can contribute to a feeling of being spied upon, and may have implications for the privacy of customers as well as employees. Telephone call accounting could conceivably be used to build a "profile" of an employee's personal or professional telephone contacts which might be used to harrass him or her. In general, the concern is that these new information technology tools might give employers powers of surveillance and control in the workplace that might be abused—used simply for the sake of control, beyond what is necessary to organize the work process.

Monitoring and the Legal Context

In general, the law has recognized the employers' interests in organizing work, selecting technology, setting production standards, and managing the use of facilities and resources. Although some aspects of working conditions may be subject to collective bargaining, the vast majority of office workers in the United States are not represented by unions. Thus, employers have had considerable latitude in making use of new monitoring technologies; they have generally been considered merely extensions of traditional management prerogatives.

On the other hand, the law also provides certain protections to employees, such as the right to join unions, to bargain collectively, or to work in a safe and healthy workplace. One question that may appear before Congress is whether employee health, or the quality of working life, or employees' rights to privacy or personal dignity need protection against possible abuses of work monitoring.

It is possible that the present extent of computer-based monitoring is only a preview of growing technological capabilities for monitoring, surveillance, and worker testing in the workplace. If this is the case, then there may be need for a new balance between workers' rights to privacy or autonomy in the workplace and management's requirements for information to efficiently control their resources. A major decision for Congress is whether the present balance between worker rights and management requirements is reasonable, and, if not, if it can be satisfactorily accommodated through stakeholder agreement, e.g., negotiation between labor and management in government and the private sector. If the use of new technology is seen as weakening the voice of employees in such negotiations, Congress may choose to take action to ensure a reasonable balance.

Photo: Courtesy of C&P Telephone

Computerization is transforming jobs like customer service and order processing.

Monitoring and the Labor Relations Context[1]

Monitoring is an integral part of a larger system of management, labor relations, industrial competitiveness, and ethical and legal systems. Much is undergoing rapid change in the United States and the issues of who is working, where we work, what jobs we do, and how we do them today may markedly differ even from the immediate past. Technology is a significant factor in these changes; so are international developments, changing labor-management relationships, and cultural values. Some specific changes follow:

- The American labor force has changed dramatically in recent decades, primarily due to the major influx of women, who now constitute close to one-half of all working Americans. It is a labor force that is better educated and includes more non-white workers.
- The shifts away from goods- to service-producing industries has accelerated in the past two decades. The United States is predominantly a white-collar, service- v. goods-producing society.

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[1] This section summarizes work in Steven Deutsch, "The Context for Exploring Workplace Monitoring," contract paper prepared for OTA, September 1986.

- Early automation in the 1950s and 1960s was largely restricted to manufacturing, but there has been an enormous growth of office automation in the past decade and investment per employee by 1990 may be comparable in office and factory settings. Computers are commonplace in office, and in retail sales.
- There has been a large growth of clerical employees: from 5 million in 1940 to 20 million in 1980, from 1 out of 10 to 1 out of 5 employees in the United States. Only 6.3 percent of males are in clerical jobs while over one-third of all women workers in this country are clericals. Since clerical work is increasingly being done on computer terminals, women are disproportionately affected by the microelectronic technology in the office environment.
- The growth of office employment and the rise in office automation makes for a greater proportion of the American work force in settings where computerized work monitoring is possible.
- Collective bargaining affects only about 20 percent of U.S. workers, and most office workers in the private sector are not unionized. A higher proportion of Federal, State, and local government employees are unionized. For union workers, there have been efforts to address the new technology, including workplace monitoring, in collective bargaining agreements and through quality of work-life committees. A parallel activity has included efforts to pass State legislation protecting workers on visual-display terminals (VDTs) and addressing worker privacy issues. Such reforms at the State and local level may well accelerate in the near future.
- The challenge for meeting international competition has pushed many in government, management, and unions to adopt a more cooperative labor-management stance and to work towards cooperative approaches for making best use of new technology. While this trend does not affect all firms, where greater labor management cooperation does exist it has allowed better resolution of many issues related to technology, job protection, training and retraining, and quality of working life.

FINDINGS OF THE REPORT

Finding #1

Computer technology makes possible the continuous collection and analysis of management information about work performance and equipment use. This information is useful to managers in managing resources, planning workloads, and reducing costs. When it is applied to individual employees, however, the intensity and continuousness of computer-based monitoring raises questions about privacy, fairness, and quality of work life.

Information about the progress and status of work is vital to managers of most organizations. Whether their output consists of manufactured goods, services, or information-based products, managers want reliable knowledge about what has been done, how long it took, what remains to be done, what people and resources are available to work with, the status of partially completed products, and so forth. This type of management information helps them to decide if staffing levels are appropriate, if more equipment is needed, if bottlenecks need to be relieved, etc.

In an office, the computer is often now the chief tool for carrying out the work process. The transformation of the original input data to a final product may require many steps performed by the computer system, a human worker, or an interaction between the two. For example, between the time a credit card company receives a sale record, and the time it mails out a payment to the merchant, and a bill to the cardholder, literally dozens of processing steps are required. The credit card company processes hundreds of thousands of sale records each week, so meticulous recordkeeping is necessary at each step to keep the process from going awry: most of the recordkeeping is done by the computer software itself, because so many transactions go on inside the computer where they are invisible to the naked eye. Monitoring software does this by keeping track of the time, type, and duration of every relevant transaction. Such meticulous recordkeeping generates a great deal of information that must be processed to produce reports usable to human managers. The particular information and amount of detail wanted will depend on the purpose of the report and the level of management. The president of the firm may want to total only transactions and revenues for the day, but line managers will want more detailed information on which to base day-to-day decisions.

Concern about electronic monitoring becomes most intense when it centers on evaluating the work performance of individual employees. A growing number of firms rely on computer-based monitoring to measure the work of at least some employees. The information can be quite detailed: How many transactions were performed? Of what type? With how many errors? When were transactions performed? How long did they take? What were the longest or the shortest? How many breaks did the employees take? When and for how long?

Although people object to monitoring because it "invades the privacy" of employees, the objections to electronic monitoring applied to individual employees cannot be phrased in terms of privacy alone. This discussion summarizes them in terms of three headings: privacy, fairness, and quality of work life. The effects in these areas are reviewed in greater detail in chapters 2 and 4.

Privacy.—Privacy encompasses the right to be left alone and to not be intruded upon. Some workers complain that electronic monitoring is intrusive because it is making a constant minute-by-minute record, creating a feeling of "being watched" all the time. This, they say, is quite different from having a human supervisor occasionally checking their work. Privacy can also refer to exercising one's own autonomy; even in routine work, there is some personal variation in work style. Some people work fast for short periods but take lots of breaks, others work fast in the morning and slow in the afternoon. These individual work styles may not matter when the basic unit of evaluation is long—say a day or a week. People with widely differing styles might accomplish the same amount of work in a day. However, continuous monitoring offers management more detailed information. If the employer uses the information gathered through monitoring to change the pace or style of work—regulating the number of breaks or requiring people to accomplish as much in the afternoon as in the morning—then the employee loses a certain amount of control over his or her own job.

Fairness.—Fairness is related to the way monitoring is implemented in the workplace. At some locations, employers and workers alike note that electronic monitoring can be a fairer basis for performance evaluation than other more subjective means. On the other hand, at other locations monitoring was viewed by employees as an unfair practice. Chapter 2 outlines some of the factors that might be considered in assessing the fairness of a work measurement program and also reviews the interviews done by and for OTA that suggest there is a range of opinion among workers about the fairness of the way monitoring is used in their organizations. Among the factors included in fairness are: reasonable standards, understanding by workers of the extent and use of the monitoring system, ability of workers to contest or correct records, and participation by workers in the design of the system.

Quality of Work Life.—Quality of work life is a complex area that is affected by many factors in the workplace. Two major objections to electronic monitoring of individual performance are allegations that it contributes to employee stress and stress-related illnesses and that it contributes to an atmosphere of distrust in the workplace. While there has been only limited direct research on the stress effects of electronic monitoring, there does seem to be some evidence that it can contribute to stress, as will be discussed below and in chapter 2.

Finding #2

Computer-based systems offer opportunities for organizing work in new ways, as well as means of monitoring it more intensively. Electronic monitoring is most likely to raise opposition among workers when it is imposed without worker participation, when standards are perceived as unfair, or when performance records are used punitively. Worker involvement in design and implementation of monitoring programs can result in greater acceptance by workers, but despite activities of labor unions in some industries and recent progress in labor-management cooperation in others, most firms do not have mechanisms to do this.

OTA's report *Automation of America's Offices* discussed in detail the ways in which computer systems can change the organization of office work. The introduction of large mainframe computers in the 1950s and 1960s probably reinforced the tendency toward centralized control, routinization of tasks, and assembly line organization of office work. However newer trends in office automation, allowing "end-user computing" and communication networks that give remote access to central databases, allow more flexibility in work organization. While many firms still use the assembly line model, others have discovered that new information technology is allowing them to "reintegrate" work. This means that jobs are made more interesting, and more effective, by giving the individual (or sometimes a team of individuals) a variety of tasks.

No matter how work is organized in the office, electronic monitoring can be applied to the computers and their users. Whether the work in question is that of a directory assistance operator, performing a very few tasks in a repetitive cycle, or an insurance company's legal case analyst whose work encompasses dozens of different activities, each transaction can still be computer monitored. In interviews with supervisors and workers, OTA found a range of opinion about the fairness and suitability of the performance evaluation systems in their firms.

Photo: Courtesy of C&P Telephone

Computerization of directory assistance helps operators perform their jobs more efficiently and also provides means to supervise work electronically.

Employee Participation.—Only a small proportion (about 20 percent) of U.S. workers are unionized. Among office workers this percentage is even lower. About 12 percent of technical, sales, and administrative support workers are represented by unions and 17 percent of managerial and professional specialty workers.[2] In most workplaces, therefore, labor organizations do not play a role in representing employee views about monitoring systems. Even when unions are involved, technological choice, such as the decision to introduce computer equipment with monitoring capability, may be considered a management right that is not subject to bargaining, although some union contracts do require employers to bargain over changes in work technology or performance standards. The monitoring issue has served as a spur to union organizing in some previously unorganized firms.

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[2] *Statistical Abstract of the United States*, Table No. 713 "Union Membership of All Workers and Median Usual Weekly Earnings," 1986, p. 424. The category of managerial and professional specialty includes school teachers, many of whom are unionized.

On the other hand, there is a growing trend in the United States, according to some analysts, toward greater labor-management cooperation in making decisions about new technology and how it is used. This trend is affecting both unionized and nonunionized organizations. While the actual number of firms involved is small, observers are encouraged that some of them are very large firms and leaders in their particular industries.[3]

Work Monitoring in Other Industrialized Countries.—In a number of other industrialized countries, where the power of employees and their representatives in making workplace decisions is greater than in the United States, there appears to be greater use of the collective bargaining process to limit the use of electronic monitoring of individuals. In some countries, legislation ensuring employees a good quality of work life has been interpreted to preclude individual monitoring as an insult to individual dignity. In Norway, Sweden, and West Germany for example, electronic monitoring is generally used to measure the performance of groups rather than individuals. In Sweden, individual monitoring is sometimes used in cases where the union and management agree there is an overwhelming need, or occasionally for nonunionized temporary workers. In addition, in some countries, electronic monitoring runs counter to other norms for enforcing work discipline. In Japan, for example, electronic monitoring of individuals goes against the tradition of teamwork and peer pressure as a means of encouraging good work and is therefore not used. One Japanese executive stated that introducing it would offend both managers and workers. Many Western European countries also have strong data privacy laws governing the use of computer-based files about individuals, but OTA did not find that these laws were a major factor in limiting electronic monitoring. In general, electronic monitoring practices were covered by quality of work life legislation and by labor-management negotiations. Monitoring in other countries is discussed in more detail in appendix A.

Finding #3

There is reason to believe that electronically monitoring the quantity or speed of work contributes to stress and stress-related illness, although there is still little research separating the effects of monitoring from job design, equipment design, lighting, machine pacing, and other potentially stressful aspects of computer-based office work.

Some research suggests that there are a number of possible health problems related to the use of computer terminals or VDTs in general, including vision, muscular-skeletal, psychosocial, and possible reproductive health problems.[4] Many of these problems can be ameliorated or eliminated through good equipment design, proper job training (e.g., allowing frequent breaks or scheduling duties away from the terminal for part of the day), and proper training (instructing workers in proper adjustment of screens, lights, and furniture). In the United States, the way that office automation systems are implemented and used is almost entirely at the discretion of employers, and there is a wide variation in their adherence to good practice in these areas.

Review of the psychological and physiological literature suggests a number of reasons why monitoring could be stressful, and a number of studies have shown a higher level of stress experienced by monitored workers. These studies are discussed in more detail in chapter 2. The particular stress problems raised by electronic monitoring are very difficult to separate from other job design or equipment design factors. For example the job of the directory assistance operator is often used as an example of a job where monitoring leads to stress. However, this job is often both monitored and paced by the computer; that is the computer not only measures the amount of time it takes an operator to handle a call, but it also automatically sends the next call as soon as the line is free. In determining why this is a high-stress job, it is difficult to separate the effects of lack of control from the effects of monitoring, and for this reason it is also hard to generalize the experiences of these operators to other types of work.

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[3] See, for example, U.S. Department of Labor, Bureau of Labor-Management Relations and Cooperative Programs, *U.S. Labor Law and the Future of Labor-Management Cooperation*, BLMR 104, Washington, DC, 1986; and Nicolas Ashford and Christine Ayers, "Changes and Opportunities in the Environment for Technology Bargaining," Massachusetts Institute of Technology, prepared for the Assistant Secretary for Policy, U.S. Department of Labor, no date.

[4] For a summary, see, Jeanne Stellman and Mary Sue Henifin, *Office Work Can Be Hazardous to Your Health* (New York, NY: Pantheon, 1983); Bob DeMatteo, *Terminal Shock—The Health Hazards of Video Display Terminals* (Toronto: NC Press, 1985); and U.S. Congress, Office of Technology Assessment, *Automation of America's Offices*, OTA-CIT-287 (Washington, DC: U.S. Government Printing Office, December 1985).

Finding #4

Monitoring the content of messages raises a different set of issues. Some employers say that service observation (listening to or recording the content of employees' telephone conversations with customers) helps assure quality and correctness of information and by protecting all parties in case of dispute. However, service observation also impacts the privacy of the customer, and workers and labor organizations have argued that it contributes to stress of the employee, and creates an atmosphere of distrust. Monitoring the content of electronic mail messages or personal computer (PC) diskettes also raises privacy issues.

Many telephone systems are designed so that certain users, usually supervisors or quality control workers, can listen in on telephone conversations. Service observation is considered an important aspect of quality control in many firms and public agencies that have a lot of telephone contact with the public. In some cases, employers may be liable for misinformation given out by their employees; they therefore want to make sure that all employees follow guidelines. Service observation, when part of a formally established program of evaluation, is legal. There is currently no requirement that employees know precisely when they are being monitored, although, at least in the Federal Government, they must be informed such a program is in effect. Some workers and unions have objected to "secret" service observation. They argue that the practice is sometimes used for control or intimidation of workers rather than to protect the customer or the firm. The "secrecy" is removed if the employee and the customer can hear a "beep" tone or other cue when a supervisor is on the line.

Photo: Courtesy of AT&T

Supervisors regularly check courtesy and accuracy of telephone operators like these through "service observation," that is, listening in on calls with customers.

Listening in on or recording employees' personal calls or calls outside of a regular service observation program have been considered eavesdropping by the courts. Service observation is discussed in more detail in chapters 2 and 4.

OTA interviewed several employers about their policies regarding the privacy of PC diskettes used by employees. All believed they had a right to search employee diskettes for personal material or unauthorized company information and would do so if they had cause to believe inappropriate material was being stored on the diskettes. Such audits of PC diskettes have taken place in the Federal Government to ensure that computers were used for official business and to check security procedures related to confidential information.

Finding #5

Telephone call accounting (computer-generated records of the time, duration, destination, and cost of calls) gives employers a powerful tool for managing the costs of telephone systems. However, it raises privacy questions when accounting records are

used to track calling habits of individuals. Other cost control technologies can be used to limit nonbusiness uses of telephones, either instead of or in addition to call accounting. Establishing a policy for use of these technologies will be especially important for the Government as it builds a new Federal Telephone System.

Call-accounting equipment and software represent the fastest growing segment of the telecommunication industry in the past few years. Divestiture and deregulation of the telephone industry, along with the falling costs of computer equipment, have made it possible for many firms to take closer control of their telephone costs. Call-accounting software can generate not only a listing of all calls, but can produce reports that highlight calls made on particular phones, to particular destinations, charged to particular accounts or for a certain length of time. All of this information can be useful for telephone systems managers in allocating costs and planning new facilities, but as discussed in chapter 3, they raise questions of privacy and fairness. Many employees use their employers' telephones for some personal calls, and some firms have used call accounting to track and prevent unauthorized telephone use, especially for long-distance calls.

Call accounting has become an issue particularly in the Federal Government, where personal use of long-distance lines is illegal. A recent audit performed by the General Services Administration, under the auspices of the President's Council on Integrity and Efficiency, found that personal use represents 33 percent of the off-network long-distance calls sampled.

Privacy concerns are also raised by telephone call accounting. A great deal of information about a person's personal and professional activities can be derived from analysis of a complete record of his or her telephone calls, even though gathering of such information was not the objective of the call-accounting system. Thus, what happens to those records and who has access to them are important considerations. Some observers have expressed fears that call records could be used to identify or harass whistleblowers, union organizers, or other dissidents within a firm or agency.

There are a variety of technological and administrative techniques that can help businesses and government agencies cut down on waste calls. Some of these can be implemented without using call accounting while others are more effective if used in conjunction with call accounting. These are discussed further in chapter 3.

The Federal Government is preparing to create a new long-distance telecommunications network, and many individual agencies are now planning the purchase of new telephone equipment, including switching equipment with call-accounting capability. Now, as these new systems are coming into place, is a good time for the government to assess the effectiveness of its current policies and determine if more workable guidelines on personal use of telephones might be developed. These options are discussed further in chapter 3.

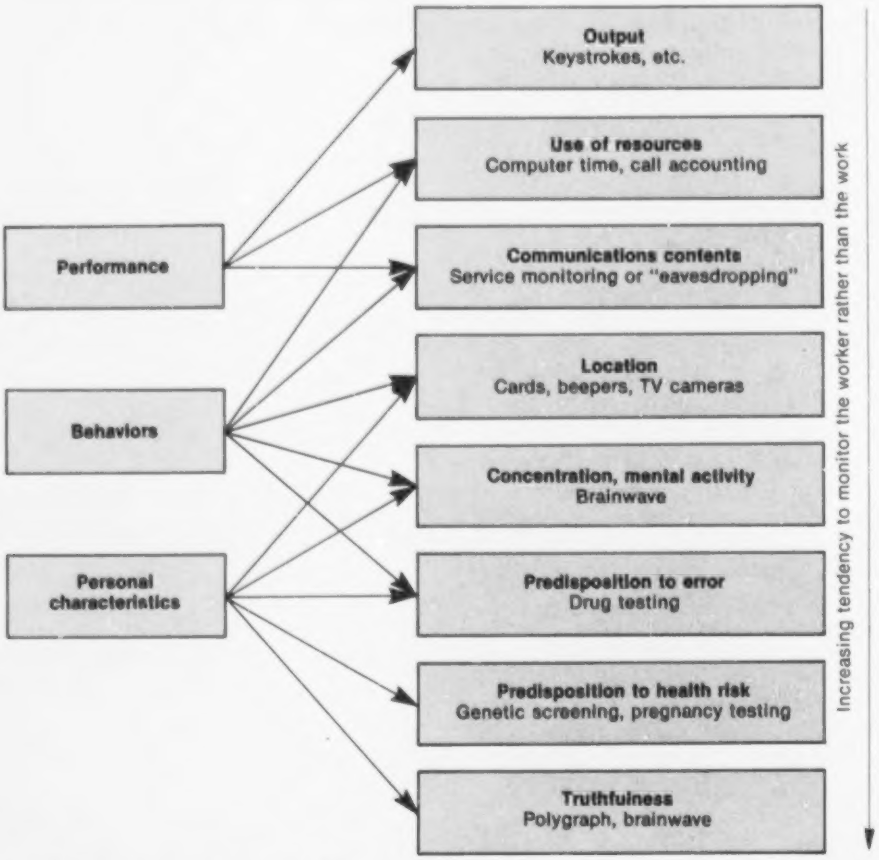
Finding #6

Electronic monitoring is only one of a range of technologies used in today's workplace to gather information about the work process or to predict work quality based on personal characteristics of the workers. Many applications of technology, including polygraph testing, drug testing, genetic screening, and, possibly, brain wave testing, illustrate the tension between employers' rights to manage their enterprise, reduce costs, and reduce liability, and the employees' rights to preserve individual privacy and autonomy. Recent concerns of employers, labor unions, civil liberties groups, the courts, and individual workers suggest that a range of workplace privacy issues are in need of resolution.

Interest in the privacy and stress effects of electronic monitoring, while of long standing in some industries such as the telephone industry, are only now reaching the awareness of the general public. At the same time, some other hotly contested issues related to workplace privacy are also receiving public attention.

Figure 1 shows a range of types of monitoring and testing that raise questions of privacy and civil liberties in the workplace. Some types

Figure 1.—Some Categories of Behavior Subject To Monitoring, Measurement, or Testing



Performance
Behaviors
Personal characteristics
Output
Keystrokes, etc.
Use of resources
Computer time, call accounting
Communications contents
Service monitoring or "eavesdropping"
Location
Cards, beepers, TV cameras
Concentration, mental activity
Brainwave
Predisposition to error
Drug testing
Predisposition to health risk
Genetic screening, pregnancy testing
Truthfulness
Polygraph, brainwave
Increasing tendency to monitor the worker rather than the work

SOURCE: Office of Technology Assessment, 1987.

of monitoring seem primarily directed toward measuring work performance or work-related activities in the workplace. OTA has called these "work monitoring" or "work measurement." Other types of monitoring and testing seem to focus more on measuring the worker himself or herself—investigating activities outside the workplace or personal characteristics that might or might not have a bearing on work performance. OTA has called these "worker monitoring" or "worker testing."

Counting the number of keystrokes someone performs in a day seems on its face to be an example of work monitoring. It is an objective measure of how much work is being done (leaving aside, for the moment the question of whether keystrokes are an appropriate measure for a given job). On the other hand, performing a blood or urine test to determine whether an employee has been using cocaine seems clearly to be a measurement of personal, individual characteristics—a case of worker testing. The test reveals the presence or absence of certain chemicals in the body—it does not show current impairment or measure job performance. This type of testing could be considered predictive—it is used to determine whether a person has potential for poor job performance as a result of drug-induced impairments.

While the terms "work monitoring" and "worker testing" may have some value as terms of analysis, it appears that all these information-gathering techniques are on a continuum with no clear boundaries. It is not always possible to make a distinction between work monitoring and worker testing. Even the most extreme examples seem to have at least some elements of both. For example, even a keystroke-monitoring system impinges on the worker as an individual if it reveals when or for how long he or she takes breaks, or if the way the monitoring information is used causes stress-related illness. By the same token, if a worker's job requires a high degree of coordination, good judgment, or trustworthiness—e.g., law enforcement or air traffic control—evidence of drug use could be said to be an objective measure of unfitness to do that job. There is a huge gray area between the extremes. Service observation, the practice of listening in on employee's telephone calls with customers, has elements of monitoring both the work process and the worker. It appears, however, that the intensity of the privacy debate increases as we move from techniques that focus on the work to those that focus on the worker.

Although this report is about electronic monitoring technologies, most of which appear to be on the "work performance" end of the continuum in figure 1, OTA looked briefly at several technologies from the "worker testing" end to see the sorts of questions raised through their use. These technologies are discussed in more detail in chapter 4 and appendix B. They are:

- **Polygraphs.**—The polygraph is not a new technology. It has had limited use in law enforcement for 60 years. Now, however, its dominant use is in personnel screening; of 2 million polygraph tests given annually, about 98 percent are given by employers to job applicants and employees.[5]
- **Substance Abuse Tests.**—Medical screening for drug or alcohol use, formerly used primarily as a diagnostic tool in clinical settings, was used by the Department of Defense in the 1970s to identify returning Vietnam soldiers with drug problems. Now nearly all military personnel, millions of private employees, and a growing number of government employees find that their jobs depend on passing such tests.
- **Genetic Screening.**—This is still an emerging technology for predicting a person's likelihood of developing diseases. It is now used only in a few workplaces, usually to identify workers who may be hypersusceptible to chemicals found in those workplaces. However, researchers expect that tests for many common diseases will eventually be commercially available; employers or insurers may want to include them in preemployment physicals.
- **Brain Wave Testing.**—Still in the research stage are a number of tests based on brain waves. Currently under study is the possible use of brain wave analysis in monitoring the level of concentration, detecting lies or "guilty knowledge," and predicting certain illnesses. A computer-based system to detect drug use by measuring brain waves is already on the market.

In addition, OTA looked at brain wave research, which in the view of some experts promises improved systems for testing for drug use, honesty, and susceptibility to disease. (See ch. 4 and app. B for a more detailed discussion.)

Serious questions have been raised about the accuracy and reliability of all these tests, as is discussed in more detail in appendix B. Polygraph tests have not been shown to have any validity in employment screening situations, and research shows that they give a high rate of false positive results (innocent people identified as deceptive.) Nor has there been research indicating that use of polygraphs reduces pilferage and other crimes in the workplace. Drug tests can be unreliable due to poor handling of urine specimens, sloppy lab work, or poorly calibrated test equipment. Regulation of commercial labs is spotty, and there are few mechanisms available to enforce high-quality work.

Employers who use polygraphs or drug tests, the types of testing now common, assert that testing is necessary to protect their businesses and to maintain a safe environment for employees and customers. On the other hand, civil libertarians and others argue that these gains, to the extent they are actually achieved by testing, have a heavy cost: undue intrusion into private lives of employees; creation of an atmosphere of fear and intimidation in the workplace; and false accusation and denial of job opportunities for many innocent people.

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[5] Harrison Donnelly, "Privacy in the Workplace," *Editorial Research Reports*, Mar. 21, 1986, p. 214, citing figures from the American Polygraph Association.

Privacy.—Drug testing by urinalysis is clearly intrusive in that it requires the subject to produce a urine specimen under observation. Genetic tests require removal of a blood specimen. Both the polygraph and brain wave testing require the subject to wear electrodes attached to the skin. Beyond these physical intrusions, however, is another privacy problem. Privacy also encompasses the ability to withhold certain information about oneself, and some of these tests reveal information that is not only personal but is arguably not relevant to the employment situation. Drug testing by urinalysis cannot determine when the drugs were used or whether drug use actually impairs job performance. Polygraph testing especially has raised controversy because some employers' tests include personal questions—particular questions on religion, sex life, political beliefs, or union affiliation. A further privacy question relates to the privacy of the records generated by the tests, both within the firm and outside. Such records, once released to insurance companies, employment clearinghouses, or others, might follow a person throughout his or her career.

Fairness.—In this context, the concept of fairness encompasses both the accuracy of the tests and the concept of "due process" within the testing program. Serious doubts have been raised about the accuracy and validity of all the tests discussed above. There is also controversy about how testing programs are to be constructed: should tests be given on a regular basis to all employees or randomly selected employees, or should they only be given to those who have shown by their behavior that there is reason to think they have been using drugs. A number of court decisions have struck down testing programs that have not relied on probable cause, or at least a reasonable suspicion, that the person to be tested is using drugs. However these cases have all involved State, local, and Federal Government employees who are protected by the fourth amendment against unreasonable searches. Employees do not have this protection from private employers.

Work or performance monitoring tends generally to raise debate about stress, fairness, and the quality of work life, including questions of privacy and autonomy. Worker testing, which tends to be more intrusive and extensive, very clearly raises controversy over individual rights of privacy (i.e., employer and employee rights to know and control certain personal information) and also questions about the accuracy and reliability of the test results. In all cases there seems to be some question of balancing the need of employers to gather information and the desire of employees to keep personal control over some aspects of their work and/or private lives.

HISTORICAL BACKGROUND

Monitoring in History

Work monitoring is not new. Employers have tried, since the earliest days of organized human endeavor, to keep track of how well their employees were working or how much they produced. The organization and supervision of work have changed over time, but it seems clear that work monitoring has been an integral part of industrial development; in many ways work monitoring seems to have intensified as industrialization has progressed.[6]

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[6] This section draws on Sandra L. Albrecht, "Historical Background to the Electronic Monitoring of Office Work," contract paper prepared for OTA, August 1986.

Industrialization in the United States has largely been characterized by a separation of planning or organizing the work process from the actual work itself. Organizational structures have evolved that rely on division of labor and place primary knowledge about the production process in the hands of managers rather than individual workers. This gives rise to a need for coordination, control, and standardization of work. The search for greater control leads to a need for more intense monitoring, whether of processes, or work groups, or individual workers, in order to give management feedback to make future decisions.

At the same time, new technologies have been adopted which incorporate certain skills in the equipment, with a corresponding "de-skilling" of work and workers over time.[7] A less skilled work force is one which is easier to manage through intensified monitoring. This is not to say that de-skilling is always the inevitable outcome of technological change. It is important to look at this long-term trend, which may be obscured by unevenness in industrial development. As certain occupations undergo de-skilling others newly created may require skills heretofore unknown. Case histories of individual occupations, however, show that over time these new occupations can also undergo a de-skilling process.[8] This trend may underlie growth in the use and intensiveness of monitoring over time. These trends are illustrated by the history of work organization in the United States dating from colonial times.

The Early Factory.—Although the American Industrial Revolution dates from the mid-1800s, a pre-industrial system of home-based production, known as the "putting-out system," already employed home workers for piece rate wages by the late 1700s. Such diverse products as shoes, furniture, lace, and textiles were produced under this system.[9] Textile production employed the largest number of home workers, primarily women and children, to do spinning, weaving, and production of hand cards for combing cotton and wool.[10]

Putting-out is a transition stage between craft production and factory labor, the precursor to mass production. It coexisted for some time with the early mills and factories, but it disappeared by the mid-19th century except in the the garment industry where home workers continued to be employed. This industry is currently seeing a resurgence in what has typically been seen as a pre-industrial work form.[11]

For the most part, deficiencies in the putting-out system gave rise to the factory system. One factor in the development of the factory was the issue of work monitoring. With the putting-out system, workers set the pace of their work day and control of the work process was in their hands. The factory system can be seen as a social control mechanism, where workers were collected together and could be monitored (watched) by supervisors or overseers, both to increase work discipline and to discourage theft.

Some view the social control of workers by employers as the primary reason for the development of the factory. Others focus on the inability of the putting-out system to effectively utilize newly developed machinery that required a central power source.[12] This integral interconnection of social control, organizational structure, and technology is a defining characteristic of industrial development.

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[7] See Andrew Zimbalist (ed.), *Case Studies on the Labor Process* (New York, NY: Monthly Review Press, 1979), both his discussion of Braverman's thesis in the Introduction and subsequent chapters on case studies of the de-skilling process.

[8] Sandra L. Albrecht, "Historical Background to the Electronic Monitoring of Office Work," contract paper prepared for OTA, August 1986.

[9] Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, MA: Harvard University Press, 1977), pp. 19 and 53.

[10] Edith Abbott, *Women in Industry* (New York, NY: D. Appleton, 1910), ch. 2; and Victor S. Clark, *History of Manufacturers in the United States 1607-1860* (New York, NY: McGraw-Hill Book Co., 1929), pp. 163 and 539.

[11] Sandra L. Albrecht, "Industrial Home Work in the United States: Historical Dimensions and Contemporary Perspective," *Economic and Industrial Democracy*, vol. 3, 1982, pp. 413-430.

[12] See discussion in Dan Clawson, *Bureaucracy and the Labor Process: The Transformation of U.S. Industry, 1860-1920* (New York, NY: Monthly Review Press, 1980), ch. 2.

The factory system collected workers together under one roof and joined them through a cash nexus: labor power was a commodity sold by workers and bought by employers. Monitoring increased, in that overseers could count the output and enforce working hours of each individual or group, but the early factory maintained a mixture of traditional and new work forms. New patterns of work hours, work pace, and discipline were instituted; but supervision, though often despotic, was primarily indirect. Management was small in size compared to contemporary standards and less knowledgeable about the actual nature of the work process. "Inside contractors," skilled workers who understood how to produce the product, were often responsible for hiring employees and overseeing the process.[13] In certain ways, inside contracting carried on the traditions of craft production and brought old styles of personal relations into the factory. But, as industry expanded and employers looked to greater rationalization, efficiency, and intensity of labor, this indirect monitoring of work was seen as an obstacle to increased productivity. Managerial philosophies soon underwent change.

Scientific Management and the Assembly Line.—Frederick W. Taylor, known as the father of scientific management, began what he defined as the scientific study of work in the 1880s, but it was not until the 1910s and later that his work began to be adopted. Taylor was not the first person to scientifically study work; craft workers had historically valued the knowledge of the labor process as well as its production. Taylor's work, rather, was the scientific study of the *management* of work, and represented the culmination of managerial ideas developing in Great Britain and the United States throughout the 19th century.[14]

The significance of scientific management is its extension of the control of work by management. Prior to scientific management, the overall setting of the workplace and workers were monitored: they were concentrated together and supervised, work hours were determined, and discipline used to ensure production quotas. But, the actual performance of work was left in the hands of workers. The central core of Taylor's management philosophy was the idea of the "separation of conception from execution."[15] Decisions about the everyday performance of work were removed from workers, and centralized in the hands of management, who in turn would determine the most rational and efficient method of performance. This brains/hands dichotomy makes management the depository of all knowledge about the work process, capable of determining in minute detail the tasks to be carried out. Workers, divested of this knowledge and control over determining work, were responsible only for carrying out the designed tasks.

With this new managerial approach, work monitoring intensified. Every task within a job came under scrutiny, and elaborate tally sheets and production forms were developed to record each detail in the operation. Measures of hand and eye movements, spacing between worker, machine, and product, time per task, level of efficiency through the day, and the effect of rest periods on production were some of the many new calculations performed in an effort to monitor production more closely. In addition to the information collected on work tasks and worker performance, there was increased emphasis on developing new tools and machinery that would conform to the growing detailed division of labor tasks. This new technology bore a design influenced by employers' interest in increasing control over work and productivity. Jobs became more subdivided and fragmented. This detailed division of labor which separates various job aspects into distinct parts and assigns them to different workers diminishes both the skill and cost of labor.[16] Scientific management, by separating knowledge from performance, increased the ability of employers to monitor the workplace, not through overbearing surveillance, but by investing them with the knowledge and determination of how work was performed.

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[13] Ibid., ch. 3; and, Graeme Salaman, *Class and the Corporation* (Great Britain: Fontana Paperbacks, 1981), pp. 37-41.

[14] For this discussion, see Harry Braverman, *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century* (New York, NY: Monthly Review Press, 1974), chs. 4 and 5. Frederick W. Taylor describes his ideas in *The Principles of Scientific Management* (New York, NY: W.W. Norton & Co., 1911).

[15] Harry Braverman, *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century* (New York, NY: Monthly Review Press, 1974), p. 114.

The development of the assembly line provides a good example of the changes that were occurring during this period.[17] The Ford Motor Co., established in 1903, began with the employment of highly skilled workers, former bicycle or carriage mechanics, who built entire automobiles. As the demand for the Model T rose, Ford introduced full assembly lines. Rather than skilled mechanics, unskilled and semi-skilled workers performed small operations in stationary positions along the endless-chain conveyor. This system greatly increased management's ability to control and monitor both the pace and intensity of work. Introduction of the assembly line, with its skill reduction and corresponding wage leveling, met worker resistance even at its earliest stages. In 1913, Ford had a labor turnover rate of 380 percent, and a unionization drive began.[18]

Scientific Management in the Office.—The application of scientific management greatly increased the volume of information to be transferred from the plant level to the office. The result was a rapid growth in the number of office workers, both managerial and clerical. Scientific management, originally conceived for factory employment, was also introduced into the office.

Many offices were restructured according to a more "industrial" style of organization: jobs were broken down into more detailed tasks, skilled aspects of the job were separated from lesser skilled operations, and the tasks were distributed among differentially paid employees. Such firms as insurance companies, where work was repetitive and easily measured, began to incorporate an assembly-line approach to the flow of work through the office.

Most measures of work production depended on paper and pencil tallies of items completed. However, there were also mechanical aids. Clock-driven "time stamps" were used to record precisely when clerks received and returned measured batches of work. Devices attached to typewriters for counting keystrokes or lines of typing were first used in the early 1900s.[19] The practice of posting charts or tables with each clerk's performance statistics, "to excite the emulation of others," was considered a useful tool for increasing productivity.[20]

While scientific management as a basic orientation of management philosophy continues today, there have been other philosophies of management with impact on U.S. industry. One was the "human relations" approach fostered by E. Mayo and colleagues at Harvard Business School in the 1930s and 1940s. This philosophy emphasized the social aspects of work and the importance of social support from fellow workers in helping determine worker productivity. Variations on this theme continue to the present. The human relations approach did not replace scientific management, and by the 1950s, the issue of power and real differences between managerial and employee interests were accepted in many managerial theories. The challenge was to integrate work organization goals—harmony, productivity, profits—with those of the employees.

Privacy in the Workplace

The idea that a worker should have some expectation of privacy in the workplace is a new one, one that is only beginning to develop in American law. Only a little more than a century ago, the employer-employee relationship was viewed as analogous to the master-servant relationship; the master had some paternalistic responsibility for the welfare or moral development of the servant; the servant owed obedience and good service. Owners of early factories believed they had the right, indeed the responsibility, to strictly control many aspects of their employees' lives, on and off the job. In the factories of the 1800s, work rules governing church attendance, place of residence, and nightly curfews were not uncommon. Even as late as the 1910s, the Ford company employed a group of 50 social workers to investigate employees' neighborhoods, home conditions, finances, and habits to determine if they were worthy of profit sharing bonuses.[21]

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[16] Ibid., pp. 72-83.

[17] Ibid., pp. 146-151; and Melvin Kranzberg and Joseph Gies, *By the Sweat of the Brow* (New York, NY: G.P. Putman's Sons, 1975), ch. 13.

[18] Keith Sward, *The Legend of Henry Ford* (New York and Toronto: Atheneum, 1948), p. 32, cited in Braverman, p. 149.

[19] See, for example, William H. Leffingwell, "This Plan More Than Doubled Our Typists' Output," *System*, vol. 30, November 1961; and William H. Leffingwell, "What 'Scientific Management' Did for My Office," *System*, vol. 30, December 1961.

[20] William H. Leffingwell, "What 'Scientific Management' Did for My Office," *System*, vol. 30, December 1961.

Gradually over the course of the 1800s, U.S. courts began to view the employment relationship as analogous to a contract between equals, with the employer buying the labor that the employee wished to sell. This view gave rise to the notion of "employment at will." Each party was free to enter or refuse the contract for any reason; if either was later displeased for any reason, either was free to break it; the employer could fire, or the employee could quit. The contract analogy does not recognize the very large differences in bargaining power that often exist between a single individual and a corporation. The National Labor Relations Act of 1935, which obligated employers to bargain with workers' representatives over hours, wages, and working conditions, marked one early action of the Federal Government to modify the employment-at-will doctrine.

The concept that an employee has a right to privacy—either to be free from intrusion or to keep certain information private—is a relatively new one. Throughout the previous century and up through the 1950s, the right of employers to inquire into any aspect of an employee's life was virtually undisputed. Employers could choose their employees in any way they wished, and were quite free to say "We want only this kind of person working."[22] Worker testing has gone through at least two periods of popularity in the United States, once in the 1920s and again in the 1950s when employers compiled psychological profiles, employment histories, and other files of personal data quite unrestrainedly.[23]

During the changing social climate of the 1960s and 1970s, court decisions and worker protection legislation gave employees some protections in how their employers could use information about them and placed a greater burden on employers to demonstrate scientific validity of employment tests. Other legislation, like the Occupational Safety and Health Act, gave employees certain protections as well as rights to information about hazards in the workplace. Antidiscrimination legislation began to limit employers' right to discriminate on the basis of race, sex, religion, age, and (in some States) union activity. A number of States have passed "mini-privacy acts" to provide some protection of workers records. In addition, a number of court decisions in the past two decades have further eroded the doctrine of employment at will, limiting employers' freedom in firing employees.

The changes in legislation and in social values in the 1960s and 1970s gave some measure of additional power to the individual in an employment relationship, and led people to the expectation that they had certain rights, including the right to privacy. Workplace privacy is a new right, however, and probably a tenuous one. It will be tested on two fronts: by the drive toward higher productivity, which encourages employers to use electronic monitoring, and current social concerns, such as drug abuse, that encourage employers to gather more and better information about the people they hire. Although employees are now beginning to feel a right to privacy in the workplace, these pressures to gather information, along with availability of the technological means to collect that information, may weaken the development of this emerging right.

The field of players involved in labor relations questions is broadening. Traditionally the parties involved were the employer, employees, and, if it existed, a union. Government involvement has been limited to establishment of guidelines for union contracts. Government has also become involved through laws that cover all workers and workplaces regardless of the union or the collective bargaining agreement. These include laws on child labor; minimum wage; nondiscrimination on the basis of race, religion, sex, and age; and finally protection of health and safety on the job. In addition, a number of laws have been passed in the past decade at the State level governing the privacy of employment and medical records and the use of polygraphs in employment.

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[21] Robert Ellis Smith, *Workrights* (New York, NY: Dutton, 1983), pp. 13-16. Also, Stephen Meyer III, *The Five Dollar Day: Labor Management and Social Control in the Ford Motor Company, 1908-1921* (Albany, NY: State University of New York Press, 1981), pp. 34-35.

[22] Citing Alan Westin in Harrison Donnelly, "Privacy in the Workplace" *Editorial Research Reports*, Mar. 21, 1986.

[23] "Can You Pass The Job Test," *Newsweek*, May 5, 1986.

Such laws were enacted because of heavy lobbying by a range of groups including unions, civil rights advocates, women, environmentalists, community-citizen alliances, health professionals, and others. This move to the legislative area to deal with workplace issues has accelerated in recent years, particularly at the State and local level. The coalition among labor, women, and environmental organizations has strengthened around the introduction of VDTs into the workplace, and on related issues such as computer monitoring. Working together, these groups are largely responsible for the generation of legislative efforts in at least 22 States to explore VDT standards. While most of these have not passed, some have resulted in advisory guidelines, as in New Mexico. In a few States these same coalitions have pushed for laws concerning electronic monitoring and service observation.

The declining proportion of the labor force represented by unions is one of the factors influencing the move toward legislative solutions to worker and workplace problems. There is persuasive evidence that efforts to establish expanded employee rights through State and local legislation will continue, both in the areas of electronic monitoring and in worker testing. Legal and policy questions are summarized below and discussed in greater detail in chapter 4.

POLICY OPTIONS

Before addressing the problem of *how* Congress might act, it is first necessary to consider *whether* and *when* action may be appropriate. Some factors suggest that a "wait and see" posture may be appropriate; uncertainty about whether monitoring causes stress, the lack of judicial precedent, the possibility of privately negotiated restraints on monitoring, and marketplace checks on monitoring are among these. Other factors indicate that Congress may want to act now to alleviate growing concern about monitoring in the workplace. These include the lack of union representation in the bulk of the monitored work force, the inadequacy of current law to address concerns over health, privacy, and dignity, the difficulties of legislating against powerful economic interests at the state level, and the increasing sophistication of the technology itself. Several possible directions oi Federal policy are described below.

Option 1:

Take no Federal action concerning work monitoring at this time.

Questions of the fairness of work monitoring practices would be left, as they are at present, in the hands of stakeholders, employers and employees. In industries where labor unions are active, collective bargaining with regard to technology change, monitoring, and methods of evaluation would continue under the current practices.

Although many unions have adopted positions opposing electronic work monitoring, their bargaining strength with respect to it, whether by informal negotiations or by formal collective bargaining or arbitration, is probably not great. However, the monitoring that does take place varies between industries and companies. An argument can therefore be made that, pending the development of a longer history of negotiations between labor and management on this issue, monitoring is best addressed at the company or union level. The parties concerned are most familiar with the specific problems, and contracts, rather than national policy, may be the best way of approaching what appears to be situation-specific problems (see ch. 4). Under these circumstances, Congress may want to avoid legislating on the issue of monitoring per se, and instead make monitoring an item for compulsory arbitration or collective bargaining under Federal labor law.

This, of course, does not necessarily ensure an outcome that is satisfactory for the majority of monitored workers, who are not unionized and are therefore powerless to negotiate fair monitoring practices, or any other aspects of the quality of work life, through the collective bargaining process. Furthermore, an increasingly large segment of the work force is made up of temporary workers, who, since they come and go on a weekly or monthly basis, have little ability to improve the quality of work life.

There is the argument that natural "market forces" may tend to limit unfair monitoring and preclude the need for congressional action even on behalf of nonunionized workers: employee backlash, low morale, and high turnover should dissuade employers from monitoring practices that their workers find onerous. If monitoring is indeed stress-producing, then employers who use it will inevitably see the effects of stress on diminished quality and output of its product or service. The response to this is that many monitored jobs are routine work that is subject to and indifferent to a high turnover rate, and in many instances, high attrition works to the employer's benefit (by lowering the costs of pension, salary increases, etc.). Thus it is not clear that "natural" checks will be sufficient to ensure that monitoring is not abused.

If natural checks are not sufficient, political action is still available. Unions and other interest groups have worked to pass State-level legislation on monitoring, service observation, or VDT health and safety. These activities will probably continue. Some of these attempts may be successful, giving rise to a variety of legislative or regulatory approaches to dealing with the issues related to electronic monitoring. Some may serve as models for Federal action at some later time, should the need for the harmonizing effect of national legislation be seen more clearly in the future.

Option 2:

Establish whether stress effects of electronic monitoring are an occupational health hazard; if they are, consider creating Federal legislation or regulations governing the use of electronic monitoring.

The effect of monitoring on stress and health—issues which might provide the policymaker with the most direct and least value-laden approach to acting on monitoring—is in a state of scientific uncertainty. There exist few authoritative studies on the effects of electronic monitoring on health. Some studies and informal polls of workers have suggested that monitoring has stressful effects, and there is a certain common sense appeal to the idea that working in fast paced, highly monitored environments may be highly stressful. However, there is no research separating the effects of monitoring from other office stressors, nor is much known about the types of monitoring that are stressful, how stress might be reduced, or how stress due to monitoring manifests itself (if at all) in physiological symptoms. Until more is known about the effects of monitoring on health, policy action under a "stress" rationale may be premature. The policymaker may consider it appropriate, therefore, to initiate studies on stress in the workplace, and on the role that monitoring plays in such stress.

The National Institute of Occupational Safety and Health would seem to be the logical agency to supervise or carry out studies of stress as a workplace hazard. Specific studies of monitored workers would have to be done with an eye to separating the effects of monitoring from those of other workplace stressors, a major deficiency in existing studies. In addition, however, it would be useful to understand more about the phenomenon of workplace stress in general, given the rising number of worker compensation claims and other evidence of the growing importance of stress in occupational health. Research may reveal that other factors in the workplace are as important as or more important than monitoring in contributing to stress-related illness, and that these should also be covered by protective legislation or regulation.

Option 3:

Consider Federal legislation aimed at gaps in current law. This could be in two possible directions: general legislation aimed at establishing certain rights for employees within the workplace, or surgical legislation aimed at specific monitoring practices.

There have been few, if any, court cases challenging the types of monitoring considered in this report. Two differing conclusions can be drawn from this. The first is that, until the judiciary acts, Congress has no way of knowing the type of legal inadequacies it should address, and ought therefore wait to legislate on work monitoring. The second is that current law is inadequate even to form the basis for a lawsuit, and that Congress must take the lead in providing rights to monitored employees, should it decide that certain forms of monitoring are unreasonable.

Current worker protection legislation gives workers a variety of rights, such as the right to a minimum wage, to organize, to bargain collectively, and increasingly, the right to know about health and safety hazards that form part of the working environment. However, U.S. law has not heretofore involved itself deeply in quality of work life issues nor in issues of personal privacy or dignity in the workplace. There is no legal right to be treated with dignity or as an autonomous person. There is no legal right to a well-designed, interesting job, nor is there law that compels employers to consider employee input in decisions about new technology or new monitoring procedures. To the extent the law treats privacy in the workplace, it looks to a standard of what an employee might reasonably expect to remain private; as discussed in chapter 4, this standard may fail as a guide for action in the face of employer's increasing use of monitoring, surveillance, or testing technologies.

That these issues are not currently addressed in law does not mean they could not be. As is discussed in appendix A, a number of other countries have quality of work life legislation. Such legislation could give guidelines on the rights to health, safety, privacy, constitutional protections, or information that employees can expect to enjoy in the workplace. As indicated earlier in this chapter, the erosion of the doctrine of "employment at will" through antidiscrimination, health and safety legislation, and public interest concerns, has already marked some involvement of the U.S. Government in regulating the work environment. The issue of electronic monitoring in offices is probably too narrow to serve as a basis for comprehensive work environment legislation. It should be just one factor of many to be considered in determining what rights U.S. citizens have in the workplace, both as employers and employees.

However, if blanket legislation on work life quality is neither wise nor desirable, Congress might address concerns over specific issues through the use of specific amendatory legislation. If, for example, telephone call accounting is an area of particular concern, Congress might address the problem specifically by amending the Electronic Communications Privacy Act to comport with what it considers "fair" monitoring practice. The guidelines developed for the audit conducted by the General Services Administration for the President's Council on Integrity and Efficiency might form a template for such legislation, or instead, Congress may mandate alternatives to telephone call accounting discussed in chapter 3 of this report.

Another example of an area of the law not currently addressed, and on which Congress may wish to act, is what might be called *transactional privacy*, or the collection of "information about information." For example, the number of keystrokes, the number of visits to the restroom, the destination of calls, etc., all provide information about transactions, rather than about the content of communications or activities (see part II of ch. 4).[24] Although present law, such as the Privacy Act and the Fair Credit Reporting Act, regulates what can be done with transactional information once collected, it does not forbid its collection as such. As discussed in chapter 4, however, the collection of transactional information, particularly if done on an intensive basis, can arouse feelings of having one's privacy, dignity, and autonomy invaded. Moreover, because of the power of computers to generate profiles and crossmatch many transactions, transactional information can yield informed estimates of the substantive content of communications or patterns of behavior—it can be, in other words, a "back door" for getting at personal information that existing law regulates.

Certainly, to forbid or regulate the collection of all transactional information would be unreasonable. Much transactional data collected by electronic monitoring software is used to monitor equipment utilization, to track totals of transactions made, and to determine whether security systems are working properly. The collection of transactional data becomes most subject to controversy when it is collected about the performance of an individual worker. It may be that Congress would choose to treat electronic monitoring as a "right to know" issue for workers; that is, employers could have the right to collect whatever kind of transactional data they wish about employee performance, but would be required to give employees access to, and if need be, correct, this information.

As this report indicates throughout, however, the issue of work monitoring cannot be adequately understood, nor appropriately addressed, in isolation from larger labor-management, privacy, and health and safety contexts in which it is embedded. Nor will specific policy actions taken with respect to particular forms of monitoring necessarily end the controversies arising out of the application of new forms of technology to the workplace. The policymaker should therefore be aware that an exclusive focus on the forms of monitoring considered in this report will at best form the basis for a series of patchwork solutions to what has been a perennial issue between workers and employers.

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[24] Transactional information, it will be recalled, differs from *substantive* information, in that the latter reveals the content or meaning of communications or documents. Transactional information, in contrast, reveals facts about communications or documents.

SOURCES OF INFORMATION FOR THIS REPORT

In compiling this report, OTA used a number of major sources of information in addition to published literature cited in the footnotes throughout the report.

One major OTA contract, completed by Alan F. Westin of the Education Fund for Individual Rights, includes the results of site visits and interviews of 110 public and private offices in 1983 and 1985-86 to examine their use of office automation including electronic work monitoring.[25] The Westin report also summarizes some of the legal implications of work monitoring and telephone call accounting. A subcontractor to the Westin project, Dr. Elaine J. Eisenman, provided a paper summarizing her 1984-85 research on employee perceptions of monitoring at six private sector sites (three unionized and three nonunionized). Her findings are based on questionnaires and group workshops conducted with 365 employees and 27 supervisors.[26]

OTA also participated in a survey on office automation equipment use that was conducted by Hay Management Group in 1986.[27] In that survey of 45 large New York area firms OTA inserted several questions to determine how many of the firms make use of electronic monitoring for purposes of planning or individual evaluation.

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[25] Alan F. Westin, "Privacy and Quality of Life Issues in Employee Monitoring," contractor report for OTA, 1986.

[26] Elaine J. Eisenman, "Employee Perceptions and Supervisory Behaviors in Clerical VDT Work Performed on Systems that Allow Electronic Monitoring," prepared as part of contractor report for OTA, April 1986.

OTA staff conducted semi-structured interviews that encompassed 35 work locations in private industry and in the Federal Government to discuss the use of work monitoring and the reactions of managers and workers to it.

In addition to the staff interviews, OTA contractor Dr. Michael J. Smith, of the University of Wisconsin, conducted semi-structured interviews of 41 monitored workers at 5 work sites.[28] These interviews were in support of his report to OTA on behavioral and psychological implications of monitoring.

An ad hoc group of representatives from a number of labor organizations working under the auspices of the AFL-CIO provided a set of 34 case examples highlighting employee reaction to the use of monitoring at a variety of unionized and nonunionized workplaces in the United States.[29]

Information about the use of electronic monitoring in other countries came from a report by Russell Pipe and Alan F. Westin of the Education Fund for Individual Rights, and one by Dr. Steven Deutsch, of The Center for Work and Society, University of Oregon. Dr. Deutsch also provided a paper on the context of labor management relations in the United States.[30]

Information on historical evolution of work monitoring came from a paper by Dr. Sandra Albrecht, University of Kansas[31] and contributions of Dr. Sharon Strom.

Information on telephone call accounting, in addition to published sources, came from OTA staff interviews of approximately 12 communications managers and 3 telecommunications consultants. Staff also used a mini case study of the State of New York telephone system, based on interviews and documents provided by the State telecommunication office. Staff also interviewed officials of the General Services Administration and a number of Federal agencies. In addition, staff interviewed two experts on whistleblowing.

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[27] Hay Group Inc., "1986 Office Systems Survey," September 1986.

[28] Michael J. Smith, Pascale Carayon, and Kathleen Miezio, "Motivational, Behavioral, and Psychological Implications of Electronic Monitoring of Worker Performance," contractor report prepared for OTA, July 1986.

[29] Cited in this report as "AFL-CIO Case Examples," November 1986.

[30] Steven Deutsch, "The Context for Exploring Workplace Monitoring," contract paper prepared for OTA, September 1986.

[31] Sandra L. Albrecht, "Historical Background to the Electronic Monitoring of Office Work," contract paper prepared for OTA, August 1986.

ORGANIZATION OF THE REPORT

Chapter 2 of this report discusses the technology of computerized work measurement, some of the jobs in which it is used, and the workplace issues raised by its use. Chapter 3 focuses on the use of telephone call accounting in both government and private firms, along with the use of other technologies to manage telephone costs. Chapter 4 presents a discussion of the legal aspects of privacy and quality of work life issues as well as a discussion of policy alternatives related to work monitoring and telephone call accounting.

In addition, this report has two appendixes: appendix A discusses policies toward monitoring in some foreign countries while appendix B summarizes the issues raised by worker testing.

Chapter 2

Using Computers To Monitor Office Work

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Chapter 2

Using Computers To Monitor Office Work

INTRODUCTION

Electronic work monitoring is the computerized collection, storage, analysis, and reporting of information about employees' productive activities. Within this broad definition, the primary focus of this report will be on obtaining data about employees directly through their use of computer and telecommunication equipment.[1] This type of information gathering has been called "electronic monitoring," "electronic work measurement," or "telephone monitoring."[2] This chapter will also include a discussion of "service observation," the practice of listening in on conversations between employees and customers to evaluate the employees' courtesy or competence. Service observation is often used in conjunction with electronic work measurement for telephone operators and customer service workers.

Some people have warned that use of electronic monitoring leads to creation of electronic sweatshops. "Electronic sweatshop,"—the term conjures up images that combine the worst features of both the factory and the office: boring, repetitive, fast-paced work that requires constant alertness and attention to detail, all done under the pressure of constant supervision and demands for faster work. Worst of all, the supervisor isn't even human. Employees must labor at top speed under the view of unwinking computer taskmasters that record every item of work completed, along with every mistake, rest break, and deviation from standard practice. A person's job depends on the computer's comparison of performance to the standard. Interaction with fellow workers is impossible because of the pace of work; job satisfaction is low, and stress and stress-related health problems are the inevitable result of having to work under such conditions.

Electronic work monitoring is already a daily reality for millions of U.S. workers. They seem to be having varied experiences with it. Some view electronic monitoring as a useful tool that helps them get better control of their work, ensures that their supervisors give objective evaluations, and helps their company be more productive. Others believe they indeed do work in electronic sweatshops as described above, and that monitoring is an unfair surveillance used to control them. Still others have mixed feelings: they may not mind monitoring per se, but they feel it isn't being used in the fairest or most effective way.

Electronic monitoring is usually used in conjuction with a work measurement system. Work measurement systems usually do four things. First, they set standards for the time it should take to produce certain units of work. Second, they monitor the actual time it takes to produce each unit of work. Third, they analyze the variance of the actual time from the standard. And finally, they provide data for use in planning, cost estimates, and productivity improvement.[3] As more employees use computers in their jobs, computer software is increasingly used to monitor actual performance, compare performance to standards, and provide planning data.

As more capabilities of the computer and telephone are being explored for office work, it is probably natural that some of the same capabilities are found useful in supervising work as well. Both work and supervision are becoming automated. Work done on a computer is very abstract. Many information workers no longer handle concrete items like documents, file folders, paper clips, orders, invoices, rubber stamps, or checks. Those physical objects have disappeared into the computer and have become abstract analogs of their former selves. The various stages of work that transform raw materials into final products take place inside the computer, too. A supervisor who could only observe the physical activity of people at their computer terminals, without knowing what was going on inside the computer, would know little about the work being done.

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[1] This definition is very similar to one found in: Andrew Clement, "Electronic Management: The New Technology of Work Place Surveillance," *Canadian Information Processing Society Session 84 Proceedings*, Calgary, Alberta, May 9-11, 1984, pp. 259-266.

[2] In this chapter, "work measurement" is used to include the whole process of developing procedures and standards for job performance, collecting data on actual performance and comparing actual performance to standards. "Work monitoring" refers only to collection of information about actual performance.

[3] See U.S. Department of Defense, Office of The Inspector General, *Work Measurement Systems and Engineered Labor Standards* (Washington, DC: October 1986).

The tool that gives a picture of what is happening inside the computer is the computer itself. Computers' capacities for recording and storing information make it possible to keep detailed records about all aspects of the production process. And their ability to sort that information in different ways means that the information can be put to many uses.

Computer records can give a picture of the total performance of a work group, or a department. Statistics on historical patterns of production can be used to estimate future workloads, to plan for new personnel, or to justify new equipment. Performance statistics may also be compared with budgeted costs to determine the cost-effectiveness of an operation. Such complete and up-to-date information is necessary in a cybernetic model of management that requires immediate feedback to managers about current activities to be used as the basis of future decisions.

Computer work monitoring can also give information on individual performance. The focus of this chapter is computer monitoring of individual performance. Computer-generated statistics can be used as a tool to increase or maintain levels of employee performance. They may be used in individual personnel decisions —pay, promotion, retraining, and discharge. They can be a feedback tool to help employees gain more control of their own work; conversely, they can be used to limit employee decisions about the work process. Like most technological tools, work monitoring per se is neither bad nor good. Its effects depend on how it is used.

WHAT KIND OF WORK GETS MONITORED?

Most of the electronic monitoring found by OTA and other researchers affects office workers with short-cycle "production" jobs, that is, jobs where a limited number of standardized tasks are performed repeatedly to produce some information-based end-product. Most such jobs are considered clerical, for example data entry or insurance claims processing. However, monitoring can also be applied to professional jobs with a quantifiable output, for example computer programmers or insurance underwriters.

Data-entry jobs are perhaps the epitome of routine, standardized information-processing work. The operator reads information from a paper source and enters it on a keyboard or keypad to be recorded on computer tape or disk. Most key-to-disk and key-to-tape data-entry systems are equipped to count operator keystrokes, and in these high-production jobs, counting keystrokes is an obvious way to measure performance.

However, key entry is not the only job where production can be monitored electronically using computer counts. Table 1 lists some of the office jobs that are often subject to work measurement from production data gathered through electronic monitoring. The list is by no means exhaustive. The table summarizes a few of the aspects of work that can be electronically monitored for each job.

What do all the jobs in table 1 have in common? Why is it that they lend themselves to computer monitoring? Jobs that are subject to electronic monitoring are generally those that are subject to work measurement techniques. In work measurement systems, man-

Table 1.—Some Office Jobs Currently Subject to Electronic Work Monitoring

Job	What is measured	How obtained
Word processors	speed, errors, time working	keystrokes counted by computer
Data-entry clerks	speed, errors, time working	keystrokes counted by computer
Telephone operators	average time per call	each call timed by call distribution system
Customer service workers	time per customer number and type of transaction	each call timed by call distribution system; transactions counted by computer
Telemarketing/other sales	time per customer; sales volume	each call or transaction timed; sales tabulated by computer
Insurance claims clerks	number of cases per unit time	time spent on each form tabulated by computer
Mail clerks	letters or packages per unit time	collected by letter of package sorting machines
Bank proof clerks	checks processed per unit of time	collected by proof machine

SOURCE: Office of Technology Assessment, 1987.

agement sets standards of production and then makes records of actual performance in order to compare them to the standard. For many kinds of work, manual recordkeeping systems or physical counts of completed work are used to gather performance information, but the growing availability of computer-based systems in offices has led many employers to collect this information electronically.

Table 2 identifies some of the work conditions most favorable to the application of work measurement. The first set of conditions is that the work be routine and require the repetitive performance of a small range of tasks. When this is the case it is possible to time those tasks and establish a standard amount of time in which a competent worker can be expected to perform them (more about work measurement standard setting below). Measurement is also easier and more meaningful when there is a large volume of work from which to draw, or a relatively continuous flow of work.

Table 2.—Conditions Most Favorable to Electronic Work Measurement

Routinized work:
- small number of tasks performed by each employee
- large volume of work
- relatively continuous supply of work

Interchangeable workers:
- relatively low training requirement
- relatively small difference in the productivity of experienced and inexperienced workers, or short time needed to bring inexperienced workers to full capability
- tolerance for turnover
- ample labor supply

Simple data collection:
- employees use information technology as part of their work
- information about transactions is already being collected for other purposes
- data collection is transparent to the users, and making use of it is simple for supervisors

SOURCES: Adapted from Robert E. Nolan, "Work Measurement," in Robert N. Leherer, *White Collar Productivity* (New York, NY: McGraw Hill, 1983); also personal communication from James Rule, August 1986.

Routine tasks can be performed by interchangeable workers. Individual employees may come and go (turnover) but the work still gets done. These jobs do not require a worker to have rare personal qualities, extensive professional training, or highly specialized skills. The training required for most routine jobs is minimal, and the amount of time needed for a newly trained worker to reach full competence is usually short. Training for some types of data-entry jobs, or for such jobs as proof machine operators in banks, can be accomplished in as little as a few days. Other routine jobs, however, require more skills and longer training. For example, training for telephone customer service representatives at firms interviewed by OTA ranged from a few days to 6 weeks, depending on the firm and the complexity of the services offered.

Although work measurement is most easily applied to less skilled jobs, it is increasingly being directed to higher level, more skilled technical, professional, and managerial positions. Even the most complex work has its routine elements, and given sufficient analysis, those elements can be identified, grouped together, and counted. The jobs of commodities broker, computer programmer, and bank loan officer, for example, could lend themselves to monitoring. They all have a high proportion of routine elements. But these jobs also require higher levels of training and experience. Work measurement and electronic monitoring can be used in jobs like these, but if workers resent them, the costs of resistance might be unacceptably high for the employer. A firm's perception of the interchangeability of certain types of workers, the ampleness of replacement labor, or their own tolerance for turnover are all relative. They can change over time with variations in corporate goals, job markets, managers' personalities, or internal corporate politics.

As was pointed out in OTA's earlier report on office automation, the change in work process that takes place when certain types of professional or technical workers start making use of computers, sometimes leads to greater standardization or routinization of their work.[4] Some researchers hold that the increased use of computers to assist professional and managerial work will lead inevitably to the de-skilling of mental work and the creation of "intellectual assembly lines."[5] Many employers are greatly concerned with getting higher performance from highly paid professional and managerial workers—the "last great frontier" of productivity improvement. Computer monitoring can offer a way to make them more accountable and to measure their performance against performance goals. There will be further discussion on electronic monitoring of professional, managerial, and technical workers later.

In table 2 the final group of characteristics typical of monitored jobs is "simple data collection." As noted below, performance statistics can be collected about many routine office jobs that are *not* computerized, usually by having the employee or supervisor keep paper records. Care must be taken to design a means of data collection which does not unduly burden workers or supervisors--otherwise the measurement system may decrease productivity because it takes too much time or reduces morale. Further, a work-measurement system that requires people to take an extra step to keep performance records may be subject to error or fraud. With electronic monitoring, manual recordkeeping can often be reduced or eliminated, even while much more detailed measurements are being made.

Jobs involving telephone contact with the public are often subject to "service observation," that is, having a supervisor or quality control specialist listen in on employee telephone calls to evaluate courtesy, accuracy, or compliance with company guidelines. Service observation is a common practice in telemarketing firms, direct sales outlets, market research firms, companies with large customer service departments, and of course telephone companies. Service observation is not new; telephone companies have been practicing it for over 80 years, as have many other firms. Service observation is also not automatic. It requires a human listener to make judgments on the content of a call.

However, new information technology has been transforming service observation by developing systems that integrate service observation with other, more automatic, monitoring techniques and also by improving the quality of new equipment. In older telephone systems, for example, a drop in volume or a click might be heard when an observer came on the line. Most modern service-observation equipment is perfectly silent and does not interfere with the operation of lines.

HOW WIDESPREAD IS ELECTRONIC WORK MONITORING?

Work Monitoring in the Private Sector

It should be noted that many computers record information about individual workers' computer use as part of computer security programs, audit trails, or cost allocation programs. Thus, in nearly every organization that has a mainframe, minicomputer, or integrated word processing system, computer-generated records are made when a terminal logs on or off; when a database is accessed; when a file is created, revised, or deleted; or when a remote computer is accessed through telecommunication lines. Some privacy implications of computer security systems will be addressed separately in a companion report.[6] However, for the purposes of the present report, such records are not considered to be work monitoring.

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[4] U.S. Congress, Office of Technology Assessment, *Automation of America's Offices*, OTA-CIT-287 (Washington, DC: U.S. Government Printing Office, December 1985), p. 105.

[5] Judith A. Perrolle, "Intellectual Assembly Lines: The Rationalization of Managerial, Professional, and Technical Work," paper presented to the American Sociological Association, Washington, DC, August 1985.

There are no reliable figures on how extensively employers are applying computer-based software to monitor individual employee performance, or to what extent they are using it to make judgments on individual pay, promotion, or discipline. No one has such figures, and no available basis for calculating them is at hand.

Before trying to estimate how many office workers are subject to work monitoring by computer, it is important to clearly define work monitoring. In this report, work monitoring will refer to the computerized collection of transactions on performance statistics used in individual work evaluations. Based on this definition it appears, as will be discussed in this section, that only a minority of office workers are monitored.

According to one work-measurement expert in the health insurance industry, some sort of statistics are collected about the computer transactions of nearly everyone who uses a computer—about 80 percent of the people in the industry. However, he estimated that only for about 20 percent of the people were these statistics actually used to measure individual performance.[7] This 20 percent represented primarily the low-skill end of the clerical work force.

Some information on monitoring was collected in the 1984 National Survey on Women and Stress, conducted by 9 to 5 National Association of Working Women. This survey received responses from 40,000 readers of four major women's magazines—*Working Woman, Ms.*, *Glamour*, and *Essence*. Of the 4,500 responses randomly selected for analysis, 43 percent reported that they used visual-display terminals (VDTs), cathode-ray tubes (CRTs), or personal computers (PCs). Of these users, 25 percent were in managerial jobs, 30 percent were professional and technical workers, and 44 percent were in clerical jobs. The clerical category combined secretarial, customer service, data entry, and similar job titles.

One question on the survey asked:

> Is your work measured, monitored, "constantly watched" or controlled by machine or computer system.

Seventeen percent of all office automation users answered "yes" to this question. When broken down by occupation, 20 percent of clericals answered "yes," compared with 15 percent of managers and professionals and and 13 percent of technical workers.

Some critics have noted that the sample in this survey is self-selected, and that the results may not be representative of all women in the U.S. work force. On the other hand, the positive replies to the question on monitoring may be lower than the actual incidence of electronic monitoring in the United States. In the course of doing this study, OTA staff and contractors often found it difficult to ask about work monitoring with a simple yes or no question. Some people simply did not understand the question without further explanation. Workers in some locations did not know that they were being monitored. In other firms, computer use information was collected but not used for but individual evaluation.

One small survey of office automation use at 45 large New York firms, conducted for OTA, suggests that electronic monitoring is still not widespread at those firms. Only eight firms (18 percent) reported using information collected through electronic monitoring as a basis for individual performance evaluations, and six firms (13 percent) used it for team or work group appraisal. Fourteen firms (31 percent) used automatically collected data for planning work force requirements.[8]

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[6] See Office of Technology Assessment, "Federal Policy on Electronic Information Security: Emerging Issues and Technological Trends," forthcoming, 1987.

[7] Fred Friedman, Director of Operations Strategy, Blue Cross Association, interview, May 23, 1986.

On the other hand, another survey of 110 organizations in 1982-84 found that the great majority of firms (80 to 90 percent) collected individual performance statistics for at least some of their workers.[9] Most of the jobs affected were the clerical jobs, but some were professional or technical. About one-quarter of the firms collecting performance statistics said they did so only for assessing group performance, to plan for peaks and valleys of work demand, and to cost-justify their use of the office systems. The remaining three-quarters were using individual operator statistics to make some sort of individual evaluation—whether for base pay, incentive pay, promotion, or training—for some of their work force. In some cases, machine statistics were "almost the entire basis" for such judgements, and in others it was "one factor in five or six factors used to evaluate performance."

A survey of the same 110 organizations in 1985-86 revealed no increase in the percentage of employers using computer measurement for personal evaluation. However, a majority of the firms now reported that they had created a "more formal system" for setting work standards and letting employees see the results of monitoring if they wished.[10]

Those organizations not collecting statistics at all were usually either:

1. organizations using older word processors or microcomputers that did not have software for measurement;
2. organizations with new applications in early implementation;
3. non-profit organizations or universities who "just don't do that"; or
4. State and local government agencies which "saw no need to compile those records."

Service observation, which is usually done for jobs where employees have a great deal of telephone contact with customers, is often combined with electronic measurements of productivity as well. As mentioned above, service observation is a standard practice in the telephone industry, and most of the Nation's 226,000 operators and service representatives are evaluated in this way. In addition, the great growth of telemarketing and telephone customer service in the past decade means that an increasing number of employees are affected by service observation. A few firms interviewed by OTA reported that they had service-observing capabilities in their telephone systems but did not use them.

Westin estimates that the great majority of clerical employees working on computer terminals—in the 65 to 80 percent range—are not currently being monitored by computer and evaluated for pay, promotion, or discipline on that basis.[11] Further, most professional, technical, and managerial workers—95 percent or more—are not currently evaluated based on computer statistics. However, if 20 to 35 percent of clerical employees are being monitored, this means that 4 to 6 million employees are being evaluated in this manner. The addition of professional, technical, and managerial workers could add another million or two to the total, and this number could grow steadily larger over the next 5 to 10 years. To this total also should be added retail sales workers and grocery clerks, whose speed and sales volume are sometimes monitored via electronic cash registers.

The clerical work force is predominantly female, and the low-skill end of the clerical work force has a disproportionate number of minority women.[12] Similarly, women are more likely to be employed in the lower levels of professional work, such as routine computer programming or routine insurance underwriting, rather than in higher levels of those professions. Because monitoring is most likely to be applied to precisely these lower level jobs, work monitoring is a topic that especially affects women and minorities.

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[8] Hay Group, Inc., "Analyses of Customized Items for the Office of Technology Assessment," 1986 Hay Office Systems Survey, September 1986.

[9] Alan Westin, "Privacy and Quality of Work Life Issues in Employee Monitoring," contractor report prepared for OTA, 1986.

[10] Ibid.

[11] Ibid.

[12] U.S. Congress, Office of Technology Assessment, *Automation of America's Offices*, OTA-CIT-287 (Washington, DC: U.S. Government Printing Office, December 1985), pp. 300-304.

Work Monitoring in the Federal Government[13]

The work-monitoring practices in the Federal Government tend to follow some of the same patterns as the private sector. There are no reliable statistics on how many Federal employees have their work monitored by computer.

In general, Westin's survey, combined with interviews by OTA, found the same sort of distribution in the use of work monitoring in the government as in the private sector. Some agencies, or specific work groups within agencies, used performance statistics only at the aggregate level and only for planning or budgeting purposes. Some used monitoring statistics as part of individual evaluation of some workers, usually clerical workers. Some, especially small agencies and those with older equipment, did no monitoring at all.

The following are a few specific examples of applications of work monitoring in the Federal Government. For example, performance statistics are automatically collected for data transcribers at the Department of Agriculture's National Finance Center. Statistics include a total time on machine, keystrokes per hour, and errors. Supervisors get daily, weekly, and monthly reports; operators get feedback monthly and some also maintain manual records of their own performance.[14] Similar performance criteria are used for data transcribers at the Bureau of the Census, but because of the design of the computer system, keyers must record the time manually. When a new system is installed in 1988, all information will be collected automatically.[15]

The Department of Labor's Office of Workers Compensation monitors the work of claims examiners and bill examiners. For claims examiners the statistics include time elapsed from case creation to case adjudication, number of adjudications, number of wage loss claims processed, and elapsed time from receipt of claim to decision. Bill examiners' statistics include number of bills paid per day, time elapsed from receipt of bill to payment. Claims examiners are in the GS 5-11 range; bill examiners are typically GS 4-6.[16]

The Internal Revenue Service, which has recently implemented its Automated Collection Service, employs about 2,300 contact representatives who speak with delinquent taxpayers by telephone, negotiate payment schedules, and update taxpayer files. Performance data is collected by computer (time per transaction, time logged on and available for work); in addition supervisors are required to listen in on calls to monitor for courtesy and correctness of information. Employees know that service observation is performed, but do not know specifically when they are being listened to. According to IRS sources, service observation is fairly infrequent and used primarily for training of new employees.

At the Social Security Administration's Teleservice Centers, service observation capability of the new telephone system has become a matter of dispute between SSA and the union representing 1,500 teleservice workers (American Federation of Government Employees). The union is attempting to negotiate specific time periods during which service observation will be used. At present it can be applied at anytime and employees do not know whether they are being monitored.

Given similar levels of computerization in the Federal Government and the private sector,[17] it seems likely that the number of monitored office workers in the Federal work force is similar to the private sector—20 to 35 percent.

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[13] This section is based on a survey performed by Westin in 1984 of 44 Federal agencies. See Alan Westin, "Privacy and Quality of Work Life Issues in Employee Monitoring," contractor report prepared for OTA, 1986, pp. 39-63. In addition, OTA staff interviewed a number of Federal agency managers and union officials.

[14] Based on OTA interviews.

[15] Based on OTA interviews.

[16] Based on OTA interviews.

[17] See OTA, *Automation of America's Offices*, op. cit.

HOW TECHNOLOGY ASSISTS SELECTED BUSINESS APPLICATIONS

The technology used in computerized work measurement is not especially esoteric. Most people whose work is electronically measured are working on mainframe or minicomputers or are using telephone systems controlled by minicomputers. Stand-alone personal computers generally do not have the power to maintain sophisticated work-measurement software while also carrying out the desired application. [See later section on "Personal Computer Monitoring."] Office systems that interlink a number of computers may sometimes have one computer dedicated to monitoring and measuring workflow.

Some work-monitoring software systems are available commercially, but in many cases, firms with large data processing departments develop their own work-monitoring software in-house, or with the help of work-measurement consulting firms. Commercially available systems in common use include those associated with key-to-disk data-entry systems, automatic call distributors, and "back office computers" for travel agents, which will be discussed later.

Individual work-measurement statistics can be developed using information that is already being collected for some other purpose. Developing work-measurement statistics from this information is simply a matter of being able to retrieve some or all of this information, store it in a separate file, and perform statistical analyses.

Because it is based on analysis of readily available information, work monitoring can even begin "accidentally," without a specific management plan to introduce it. For example, in one Midwestern bank, the data processing department installed a "black box" to record the time, type, duration, originating terminal, and user for every inquiry or transaction in on-line databases. The purpose was to monitor the speed of computer response time and to make sure other departments were getting the level of service promised by the data processing department. Itemized reports were sent to managers, who found that these reports were useful for other purposes, such as planning personnel schedules, justifying requests for new staff or equipment, and measuring the time it took individual employees to complete transactions.[18] They are now being used as work-monitoring tools in at least some of the participating departments.

In most locations, work-measurement tools were developed explicitly for the purpose, but the idea is still the same. They collect and reanalyze information that is already being recorded about computer utilization or business transactions. For example, travel agents at some large agencies work on terminals connected to a network that includes a nearby minicomputer and a mainframe computer at some central location. The applications software in the mainframe allows them to check schedules and make or cancel reservations. The minicomputer, called in some organizations the "back office computer," records details about computer utilization. It notes who logged on to which terminal at which time, and it also makes records of the time, type, and amount of each transaction that the agents perform on the mainframe. Thus the back office computer provides a local audit trail and sales record for the whole office. This information can be used in a number of ways, for example, it allows the local printing of tickets and itineraries for customers. It also can be used to develop individual performance histories, since it has a complete record of all the computer activities of each agent.[19]

In other firms interviewed by OTA, work monitoring software was an integral part of the application software. That is, the same computer software package that helps an insurance claims examiner to key in client information and calculate the amount of a payment, also automatically tallies the number of claims of each type that each examiner completes in a day. In several cases these tallies were then transferred to another computer program, perhaps in a personal computer, which does statistical analyses, compares performance to established standards, and prints reports for supervisors.

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[18] OTA interview with Senior Vice President for Operations, a midwestern bank, May 1986.

[19] OTA interview with three travel agency managers, June 1986.

Collection of data about employee performance can in many cases be made transparent to the user, that is, information can be collected without interfering with the work that is being done. From the viewpoint of the user, an automatic call distributor (ACD) simply routes incoming calls to individual telephones. In actual fact, however, the distributor is also automatically recording the type of call (inside or outside line), the time the call arrived, the identity of the employee to whom it was routed, the number of seconds before the employee picked up, the time the call started, the time the call ended, the number of times the caller was put on hold and for how long, the extension to which the call is transferred, the number of seconds before that person picked up, and so on. In addition, it can show the supervisor at any moment which operators are busy, which are waiting for work, which are on break. At the end of the day it can provide summaries of individual and group activities.

Properly organized, this can be very useful management information. For example, an ACD can report the number of seconds customers were "delayed" before someone was available to help them or the number of customers that "abandoned" calls—hung up without speaking to anyone. If these figures get too high it may indicate the need for more telephone lines and more customer agents. Analysis of daily or monthly work volumes can help managers better understand cycles in their business so they can predict busy periods when they must hire temporary workers or offer overtime.

The example in figure 2 shows such a status report. Service level ("serv level") is the percentage of incoming calls that were answered within the specified time (typically 20 seconds). Calls offered is the total number of calls, including those that were lost, delayed, or diverted as shown in the following columns. Positions manned ("pos manned") means the number of agents jacked in and ready to work; the following columns indicate whether the agents are on incoming or outgoing calls. Average delay is the average time in seconds for a call to be processed, whether answered, delayed, or lost. The next columns show the number of calls waiting (CW), the maximum number of calls that were waiting at any time in this period, and the number of seconds that the current longest call waiting has waited.

Here again, reports about individual performance are fairly simple to develop based on information that must be collected in any case. In order to route calls, the computer controlling an automatic call distributor must keep track of which telephones are busy, which are available, and which are unattended at any given time. However, this information must be sorted and averaged in order to be of use. A supervisor could make no sense of all the detailed information that a computer collects about each call. The work-monitoring software sorts, totals, averages, and summarizes the information so that a supervisor can see activities of the entire work group, or totals and averages of each individual's activities for a given

Figure 2.—Example of a System Status Report for an Automatic Call Distribution System

Gate	Serv level	Calls offrd.	Calls dlyd.	Calls Lost	Calls div.	Pos. manned	Calls in	Calls out	Avg. delay	CW	Max CW	Odly time
1	47	15	8	7	1	6	0	2	1	0	1	0
2	43	7	4	4	0	3	1	2	2	3	3	91
4	67	6	2	1	1	6	0	0	7	0	1	0
	52	28	14	12	2	15	1	4	3	3		

SOURCE: Adapted from Solid State Systems Inc., "The Smart Telephone System ACD Supervisor User's Guide," Marietta Georgia, 1982.

timed period, or exception reports, that show particular calls or particular employees that are far out of the average range.

Figure 3 shows the type of information typically available on the VDT screen of the supervisor of a group of telephone customer service workers using an automatic call distribution system. Status options here include vacant ("vcnt") or on break, talking ("talk") or available for calls ("avlb"). "Work" means the agent is doing other work related to a previous call, perhaps updating the database or preparing a letter to the customer, and is not accepting calls. The agent named Joe is talking and has signaled for "help," requesting the supervisor to come on the line. The time column shows how long (in minutes) the individual has been in the current status. The last column shows that three agents have calls waiting for them on other lines.

The example in figure 4 shows the sort of information that might be included in productivity reports summarizing periods of a few hours, or a day, or a week. This example reports the number of calls, the total handle time ("hndl") in minutes (the sum of "talk time" and "work time"), and the total time available and waiting for calls, in minutes. In addition the report shows the average handle time, talk time, and work time per call in seconds.

Figure 3.—Example of a Supervisor's Display in an Automatic Call Distribution System

```
                         AGENT    AGENT    STATUS   TIME     10:32       5/10/87
SUPERVISOR      GATE      NO      NAME                      SUPVS   1

    1             1       513      SAM      VCNT     6.3     CW = 4
                  1       512      JANE     TALK     0.3
                  1       514      JOE      HELP     1.2
                  1       560      BILL     WORK     4.7
                  2       570      FRED     AVLB     6.3
                  2       510      SUE      TALK     1.2
                  2       513      SAM      VCNT     6.3
                  3       512      JANE     TALK     0.3     CW = 1
```

SOURCE: Adapted from Solid State Systems Inc., "The Smart Telephone System ACD Supervisor User's Guide," Marietta Georgia, 1982.

Figure 4.—Example of Agent Statistics From an Automatic Call Distribution System

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14:32 10/14/82                         AGENT STATISTICS

AGENT                         NO.    HNDL   TALK   WORK   AVLB   AVG    AVG
GROUP 4               GATE   CALLS   TIME   TIME   TIME   TIME   HNDL   TALK   WORK

GEORGE      454        1       0      0.0    0.0    0.0    0.0
HARRY       455        1       0      0.0    0.0    0.0    0.0
JERRY       582        1       6      8.4    8.4    0.0    6.9    84     84      0
SUPV1       580        1       5      3.5    3.5    0.0    5.7    53     53      0
SUSANNAH    501        1       5     10.0   10.0    0.0    5.3   120    120      0
BILL        503        1       4      3.6    3.6    0.0    3.2    54     54      0
```

SOURCE: Adapted from Solid State Systems Inc., "The Smart Telephone System ACD Supervisor User's Guide," Marietta Georgia, 1982.

WORKPLACE ISSUES RELATED TO WORK MONITORING

People in some organizations perceive work measurement and service observation to be useful tools that help employees and management at all levels to put out a good product. At other organizations, use of the same technologies is resented and feared as "Big Brother

Figure 5.—Two Models for Electronic Work Monitoring

UNION MODEL	Individual performance sampling	All data available to employee	Known procedure for challenging "record"	Employee can pace work	Group production quotas	Quality/problem factors recognized	Standard pay	Individual shortfall leads to training or group discussion
"TAYLOR" PRODUCTION MODEL	Constant machine monitoring	Data not readily available	No procedure for challenge	Machine paces work	Individual quotas	Quantity/speed standard	Piecework pay or bonus	Individual shortfall leads to discipline

PRIVACY-RELATED ISSUES: "Intrusiveness" and "Subject Access"	LABOR RELATIONS/EMPLOYEE RELATIONS ISSUES "Fair Work," "Fair Pay," "Fair Performance Evaluation"

SOURCE: Alan F. Westin, "Privacy and Quality of Life Issues in Employee Monitoring," contractor report for OTA, 1986.

Table 3.—Workplace Issues Related to Work Monitoring

	Privacy and access related	Labor relations or "fairness"	Health/quality of life
Is monitoring constant or intermittent?	X		X
Can employees see their own records?	X		
Can the employee challenge, explain, or correct records?	X	X	
Does the employee or the machine pace the work?		X	X
Do employees understand performance criteria and use of information?		X	X
Are quotas set on an individual or group basis?		X	
Are quotas fair, allowing work at a reasonable pace?		X	X
Is pay standard or based on performance?		X	
What happens to employees falling short of quota?		X	X

SOURCE: Office of Technology Assessment, 1987.

surveillance." The difference seems not to be so much in the specific measurement technology, but in the politics of how it is introduced, how it is used, and what is done with the information collected.

Although many workers' complaints about monitoring focus on its intrusiveness, a closer look shows that privacy is only one of a complex of issues raised by electronic work monitoring. Table 3 outlines some possible characteristics of a work-monitoring program and indicates the kinds of issues that are raised by them. Privacy and access issues cover such questions as whether employees know they are being monitored and whether the employees have access to records about their own performance. The second set of issues relates to the perceived fairness of the monitoring system and the way the employer uses it in evaluating and rewarding employees; these are questions of employee relations. The final set of issues, overlapping the other two, relate to stress, health, and the quality of working life.

Whether the effect of monitoring is perceived as intrusive, unfair, dehumanizing, or unhealthy often depends on how management structures the work-monitoring program, what it does with the data it collects, and how those actions are perceived by employees.

What Is Fair

Westin used some of the same elements discussed in table 3 to construct two models of work monitoring shown in figure 5.[20] Westin chose to call the first model the "union" model, since it represents a blend of features included in model contract language suggested by some U.S. and international unions. The second he called the "Taylor production" model; it is based on an extreme form of an industrial engineering approach to work measurement, one which places virtually all information and power in the hands of management. In applying these models to the organizations interviewed for OTA, no pure examples of the "union model" were observed. The "Taylor production model" in its pure form was observed in action in a few government and private sector organizations. Most organizations used methods representing a blend of the features of the two models, with about two-thirds of the organizations interviewed by Westin tending toward a modified version of the "Taylor" model.

In most cases, employers introduce electronic monitoring unilaterally, only informing employees of the change after all decisions have been made. Often, too, monitoring is only one of a number of changes in work process or job design that take place when new office equipment is purchased. As was discussed in detail in OTA's report, *Automation of America's Offices*, employee participation in design and implementation is often a key to successful implementation of new office systems.

Ensuring employee participation can require effort on the part of managers, as few U.S. workplaces have mechanisms for employee input in areas of technological change or evaluation procedures. Nevertheless, Westin found that the difference between employees protesting over "Big Brother surveillance" and employees perceiving work measurement as reasonable, often depends on whether they agree on: 1) the fairness of the standards set; 2) the fairness of the monitoring process employed; and 3) the fairness of the way measurements are used in employee evaluation. This agreement was usually made through worker-management discussions before monitoring was implemented. Such agreements are possible where there is genuine involvement of employees—either through joint labor-management committees in unionized organizations, or through employee involvement techniques in nonunion settings. Where management started with the trusting assumption that almost all employees were ready to put in a fair day's work for a fair day's pay, and where topics such as work standards, work measurement, and productivity recognition were matters for open discussion, introduction of monitoring was usually relatively painless.

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[20] This section draws heavily on Alan Westin, "Privacy and Quality of Work Life Issues in Employee Monitoring," contractor report prepared for OTA, pp. 103-112 (draft).

One impression that emerged from OTA's interviews is that the way managers and employees deal with monitoring often closely parallels the way they deal with other workplace issues. Firms whose "corporate culture" tends toward authoritarianism tend to use monitoring in an authoritarian way. In organizations where relations between employees and managers are antagonistic, the monitoring system is a source of antagonism, but only one of many. In organizations where cooperation is the norm, people worked together to develop a fair system.

Recognizing that employee involvement in the design, testing, implementation, and continuing adjustment of work monitoring is crucial to a successful process, it is also necessary to deal with the *substantive issues*, to be considered in designing such a program. Table 4 shows some of the issues to be considered. The main categories, and the specific questions in this chart represent recurring themes in a number of interviews with monitored workers and their managers.

Table 4.—Key Issues and Problem Areas in Monitoring Worker Performance

Key issues/problem aspects

Fairness of work standards:
- Do standards fairly reflect the average capacities of the particular work force?
- Will they create unhealthy stress for many employees?
- Do they take into account recurring system difficulties and other workplace problems?
- Do they include quality as well as quantity goals?
- Do they represent a "fair day's pay" for a "fair day's work?"
- Do employees share in any productivity gains achieved through introduction of new technology?

Fairness of the measurement process:
- Do employees know and understand how the measurements are being done?
- Can the measurement system be defeated easily, thereby impairing the morale of those willing to "follow the rules?"
- Do employees receive the statistics on their performance directly, and in time to help them manage their work rate?
- Is the relation between quality, service measures, and work quantity communicated by supervisors when they discuss problems of performance levels with employees?
- Do supervisors communicate clearly that they are taking system and workplace problems into account?
- Are group rather than individual rates used when particular tasks make such an approach more equitable?
- Is there a formal complaint process by which an operator can contest the way work data has been used by the supervisor?

Fairness in applying measurements to employee evaluation:
- Are there meaningful recognition programs for these employees?
- Is work quantity only one of a well-rounded and objective set of performance criteria used for employee appraisals?
- Does the employee get to see and participate in the performance appraisal?
- Is there an appeal process from the supervisor's performance appraisal?
- Is there a performance-planning system that identifies employee weaknesses in performance and identifies ways to remedy such problems?

SOURCE: Alan R. Westin, "Privacy and Quality of Life Issues in Employee Monitoring," contractor report for OTA, 1986.

Westin's sample found that only about one-third of the firms in his sample using electronic work monitoring for individual evaluations were following what he called "fair work evaluation policies" along the lines of a positive answer to most of the questions in table 4.

Of the 34 case examples submitted to OTA by unions, 28 dealt with electronic monitoring of office workers (unionized and nonunionized) like the ones studied by Westin. In nearly all the case examples, employees had little input concerning the monitoring system, and in only a few cases was it clear that they had access to information about their own performance or the ability to contest wrong information. In nearly all these cases the workers were described as considering the monitoring system unfair.[21]

Standards of Performance

Work measurement systems are usually applied to jobs for which standard end products, or surrogates for end products, can be clearly identified. That end product might be "customers served," "claims paid," "programs written," "interviews completed." Generally speaking, electronic work monitoring primarily measures the quantity of work performed. Other methods, discussed in the next section, measure quality.

An important element in measurement of almost all kinds of work is *time.* In almost every case in table 2, the purpose of measurement is to measure the time it takes the employee to do something, and then to compare the result to a standard. Robert Nolan, an expert in developing work-measurement systems, defines a work-measurement system in this way:

> In the most simple terms, it is a means of establishing what a fair day's work should be. It has two main components, a measure of the volume of work, and a measure of the employee time used up. These two factors can be expressed in their only common denominator: the time required to produce one unit of work, or what we call a standard.[22]

Thus, measurement alone is often of little use as a management tool, unless its purpose is to compare the individual or group performance to a standard.

Standards may be established in a number of ways. Many are arrived at rather informally or arbitrarily, perhaps based on supervisors' or managers' estimates of how long it ought to take to complete certain tasks. In some cases standards are set based on historical performance levels; managers may take an average of some past period, and expect that it be maintained as an average in the future.

Sometimes "standards" are really goals or ideals. In one firm interviewed by OTA the standard of 50 completed transactions per agent per week had recently been established by the national office. The standard was developed by dividing the average revenue per transaction into the total revenue the firm hoped to generate at each branch office.[23] The new standard was not related to past performance levels or analysis of the best way to do the job, but rather to the amount that must be sold in order to meet revenue projections. In this case, 50 transactions per week was far above past performance; office managers hoped that introducing incentive programs would inspire agents to achieve the new goals.

A more formal method of standard setting is the "engineered standard." The Methods-Time Measurement (MTM) system or the Advanced Office Controls (AOC) system have been used in many office settings. In these methods, a trained analyst, usually an industrial engineer, observes a work task, selects the most efficient method of performing the task, and then will time the actions of average people performing the task under average working conditions. General MTM and AOC standards have been developed for nearly every imaginable motion in an office workplace. For example, the MTM standard for fastening sheets of paper with a table model stapler is 41 time measurement units (TMU), or about 2.9 seconds. Opening an envelope and removing the contents takes 198 TMU or 14.2 seconds. A trained analyst can combine a number of these general standards, develop new ones, and adapt them to the special circumstances of spacial arrangement, work process, or equipment use in a given office.[24]

A well-designed standard, according to experts, is not one that makes people work as fast as possible, but one that encourages good average work. It should include time for personal breaks and allow for personal variability—working a little faster at some times and slower at others. Fair standards must be realistic, taking into account system downtime, slow response time, varying levels of complexity of different tasks, and so on. When standards are not realistic, or when they are not perceived as fair by employees and managers, they can easily lead to declines in morale, increased turnover rate, and ultimately a decrease in productivity.

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[21] "AFL-CIO Case Examples," November 1987.

[22] Robert E. Nolan, "Work Measurement," in Robert N. Leherer, *White Collar Productivity* (New York, NY: McGraw Hill, 1983), p. 111.

[23] OTA interviews, assistant manager, Washington office, national travel firm, June 1986.

[24] Examples from Robert E. Nolan, "Work Measurement," in Robert N. Leherer, *White Collar Productivity* (New York, NY: McGraw Hill, 1983), pp. 142-146.

Since AOC, MTM, and other "predetermined time" systems provide a standard time for the completion of each task, an employee's actual performance can be compared to that standard. If the standard time for examining a certain type of insurance claim is 10 minutes, then an employee who completes 6 of them will have done 60 standard minutes or 1 standard hour's worth of work. An employee who completed 48 such cases in an 8-hour day would be said to be working at 100 percent of the standard, that is, his or her *paid* hours would exactly equal *standard* hours. Faster employees might work at 110 or 120 percent of standard, while slower ones work at 80 or 90 percent of standard. The determination of an "acceptable" pace depends on the firm, but a well-designed standard is one where most trained, experienced employees will work in the range of 85 to 100 percent of standard most of the time.[25]

Figure 6 shows part of a weekly work monitoring report for an insurance employee working under a "predetermined time" work-measurement system. The report lists the types of tasks done, the standard time to do the task once, the number of times the employee actually completed the tasks, and a calculation of the "earned" hours. Figure 7 summarizes work of a group of insurance employees. Figure 8 integrates the work monitoring system with a time and attendance report. It shows the number of hours each employee was available for work ("avail work"). The time available for *measured* work ("avail meas"—employees may have other duties that are not captured by the system) and the number of earned hours ("earn hrs") worth of work completed. Note that there

Figure 6.—Example of Individual Work Monitoring Report (Performance Summary)

```
RUN NUMBER - ARM1B140            WORK MANAGEMENT PROGRAM
DATE OF RUN - 10/09/84         INDIVIDUAL PERFORMANCE REPORT
TIME OF RUN - 18:00
                                     WEEK ENDING 10/6/84

EMPLOYEE:            EMPLOYEE D
DIVISION:      G     CLAIMS AND SERVICE
DEPARTMENT:    GB    CLMS PROC

----------------------------------CALCULATION OF EARNED HOURS----------------------------------

              KVI DESCRIPTION                    UKVI    AVERAGE TIME         ITEMS        EARNED
DV    DP     CODE        NAME                    FLAG   TO DO ONE ITEM  ×  COMPLETED   =   HOURS

G     GB     0040   EOB STUFF                           00 MIN 16 SEC        148            0.6
G     GB     0050   SUBSCRIBER PREP                     01 MIN 48 SEC          2            0.0
G     GB     0070   SUBSCRIBER CODING                   03 MIN 54 SEC          2            0.1
G     GB     0080   PROVIDER CODING                     01 MIN 03 SEC          8            0.1
G     GB     0140   MEP ADJUDICATION                    02 MIN 47 SEC        482           22.4
G     GB     0150   VISION ADJUDICATION                 02 MIN 33 SEC         68            2.9
G     GB     0175   PRIMARY GSCR ROSTER                 00 MIN 10 SEC        621            1.8
G     GB     0176   GSCR CHK-ADJUDICATOR                00 MIN 08 SEC        454            1.0
G     GB     0190   COB PROCESSING                      04 MIN 57 SEC         20            1.6
G     GB     0210   COB RETURN LETTERS                  00 MIN 49 SEC         50            0.6
G     GB     0185   PULLING CLAIMS                      03 MIN 00 SEC          8            0.4

                                                         TOTAL EARNED                      32.0
```

SOURCE: Adapted from James S. Hogg, Manager, Professional Productivity, Blue Cross & Blue Shield of Maryland.

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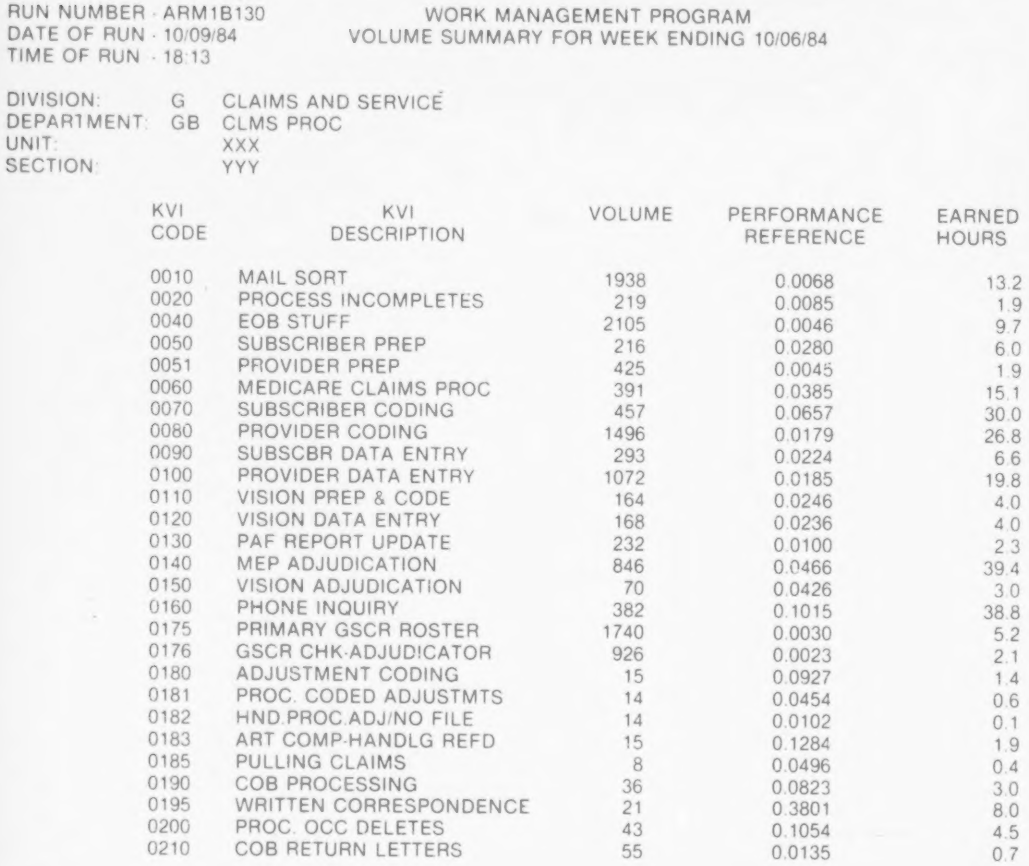
[25] See Robert E. Nolan, "Work Measurement," in Robert N. Leherer, *White Collar Productivity* (New York, NY: McGraw Hill, 1983), p. 121.

Figure 7.—Example of a Work Monitoring Report for a Group (Volume of Work Accomplished by Group in One Week)



```
RUN NUMBER - ARM1B130                WORK MANAGEMENT PROGRAM
DATE OF RUN - 10/09/84        VOLUME SUMMARY FOR WEEK ENDING 10/06/84
TIME OF RUN - 18:13

DIVISION:       G    CLAIMS AND SERVICE
DEPARTMENT:     GB   CLMS PROC
UNIT:                XXX
SECTION:             YYY

        KVI             KVI                  VOLUME    PERFORMANCE     EARNED
        CODE         DESCRIPTION                        REFERENCE      HOURS

        0010    MAIL SORT                     1938       0.0068         13.2
        0020    PROCESS INCOMPLETES            219       0.0085          1.9
        0040    EOB STUFF                     2105       0.0046          9.7
        0050    SUBSCRIBER PREP                216       0.0280          6.0
        0051    PROVIDER PREP                  425       0.0045          1.9
        0060    MEDICARE CLAIMS PROC           391       0.0385         15.1
        0070    SUBSCRIBER CODING              457       0.0657         30.0
        0080    PROVIDER CODING               1496       0.0179         26.8
        0090    SUBSCBR DATA ENTRY             293       0.0224          6.6
        0100    PROVIDER DATA ENTRY           1072       0.0185         19.8
        0110    VISION PREP & CODE             164       0.0246          4.0
        0120    VISION DATA ENTRY              168       0.0236          4.0
        0130    PAF REPORT UPDATE              232       0.0100          2.3
        0140    MEP ADJUDICATION               846       0.0466         39.4
        0150    VISION ADJUDICATION             70       0.0426          3.0
        0160    PHONE INQUIRY                  382       0.1015         38.8
        0175    PRIMARY GSCR ROSTER           1740       0.0030          5.2
        0176    GSCR CHK-ADJUDICATOR           926       0.0023          2.1
        0180    ADJUSTMENT CODING               15       0.0927          1.4
        0181    PROC. CODED ADJUSTMTS           14       0.0454          0.6
        0182    HND.PROC.ADJ/NO FILE            14       0.0102          0.1
        0183    ART COMP-HANDLG REFD            15       0.1284          1.9
        0185    PULLING CLAIMS                   8       0.0496          0.4
        0190    COB PROCESSING                  36       0.0823          3.0
        0195    WRITTEN CORRESPONDENCE          21       0.3801          8.0
        0200    PROC. OCC DELETES               43       0.1054          4.5
        0210    COB RETURN LETTERS              55       0.0135          0.7
```

SOURCE: Adapted from James S. Hogg, Manager, Professional Productivity, Blue Cross & Blue Shield of Maryland.

is a wide variation in effectiveness ("eff %"), which calculates the earned hours as a percentage of measured hours. This particular firm does not use an incentive system so all employees are paid for their regular hours despite these differences. The report also shows totals for the whole group.

The work process—the set of procedures that govern what tasks are done and how tasks interrelate—also has a major impact on many predetermined-time work-measurement systems. Because the "standard" for each task or set of tasks depends on a close study of the work performed, any changes in the work require a change in the standard, if the standard is to be fair. Changes in the work might arise when a new product is introduced (say, in an insurance company, a new kind of policy), or when regulations change (e.g., requiring a change in the kind of information banks must supply to customers), or when the technology changes. Work-management specialists at firms using predetermined-time systems note that "maintenance" is a major need if work measurement is to be applied conscientiously. Work must be periodically re-analyzed and standards must be adjusted.

Standard setting is often combined with job design, work simplification, or procedural changes, because it is difficult to establish a

Figure 8.—Example of Individual Work Monitoring Report (Hours Summary)

WORK MANAGEMENT PROGRAM
HOURS REPORT

RUN NUMBER - ARM1B140
DATE OF RUN - 10/09/84
TIME OF RUN - 18:08

WEEK ENDING 10/06/84

DIVISION: G CLAIMS AND SERVICE
DEPARTMENT: GB CLMS PROC

EMPLOYEE			TIME SPENT AT WORK				TIME NOT MEASURED						
NUM	NAME	ST	REG. TIME	+ OVER TIME	− TIME NOT WORKED	= AVAIL WORK	− PROD	− RFW	− UKVI	− OTH	= AVAIL MEAS	EARN HRS	EFF %
1518	EMPLOYEE A	03	37.5	0.0	23.2	14.30	0.0	0.0	0.0	0.0	14.30	11.6	81
4529	EMPLOYEE B	03	37.5	0.0	0.2	37.30	0.0	0.0	0.0	4.9	32.40	26.4	81
4669	EMPLOYEE C	03	37.5	0.0	0.2	37.30	0.0	0.0	0.0	0.4	36.90	18.1	49
5206	EMPLOYEE D	03	37.5	0.0	0.2	37.30	0.0	0.0	0.0	1.9	35.40	32.0	90
5210	EMPLOYEE E	03	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.00	0.0	0
5244	EMPLOYEE F	03	37.5	0.0	0.2	37.30	0.0	0.0	0.0	1.0	36.30	15.1	41
5245	EMPLOYEE G	03	37.5	0.0	0.2	37.40	0.0	0.0	0.0	2.4	35.00	23.4	66
5246	EMPLOYEE H	03	37.5	0.0	0.2	37.30	0.0	0.0	0.0	5.7	31.60	22.0	69
5247	EMPLOYEE I	03	37.5	0.0	0.2	37.30	0.0	0.0	0.0	0.0	37.30	24.7	66
5255	EMPLOYEE J	03	37.5	0.0	0.2	37.30	0.0	0.0	0.0	17.7	19.60	29.1	148
5256	EMPLOYEE K	03	37.5	0.0	0.9	36.60	0.0	0.0	0.0	0.8	35.80	35.0	97
5257	EMPLOYEE L	01	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.00	0.0	0
5258	EMPLOYEE M	03	37.5	0.0	36.9	0.60	0.0	0.0	0.0	0.6	0.00	0.0	0
5435	EMPLOYEE N	03	37.5	0.0	15.2	22.30	0.0	0.0	0.0	1.8	20.50	12.9	62
SECTION TOTALS			450.0	0.0	77.7	372.30	0.0	0.0	0.0	37.2	335.10	250.3	74
COST CENTER TOTALS			450.0	0.0	77.7	372.30	0.0	0.0	0.0	37.2	335.10	250.3	74

PERSONNEL EMPLOYED 14

EQUIVALENT PERSONNEL AVAILABLE FOR WORK 9.9

SOURCE: Adapted from James S. Hogg, Manager, Professional Productivity, Blue Cross & Blue Shield of Maryland.

set time for performing a task if everyone is free to do it in a different way. Some ways are better than others, whether faster, less fatiguing, or more reliable. Experts in productivity and work measurement usually counsel that employees should be included in the process of changing procedures and establishing standards. They argue that employee involvement not only short-circuits resentment to standards that are imposed from outside, but usually leads to the creation of better procedures and fairer standards, since employees understand the work that needs to be done better than anyone, including their managers.

An example of employee involvement in standards development is the case of legal case analysts at an insurance firm.[26] These highly skilled workers handle correspondence and track the progress of legal cases on a computer-based legal diary system (LDS). Although the LDS software created some internal statistics on the transactions done, they had not been previously used for individual evaluation because no standards had been developed for the case analyst's work. The work-measurement specialist assigned to develop standards found the work very complex and also saw that the legal diary software was very flexible, allowing analysts to use several different procedures for certain tasks. Instead of trying to prescribe procedures and standards, the work-measurement specialist held a series of 24 two-hour seminars in which the analysts talked about their work. They discussed different tasks, compared their approaches, and decided among themselves the simplest and most effective procedures for each task. They also helped to set the standard times for the tasks. Interestingly, the productivity of this department, in terms of dollars recovered through legal actions, began to increase before the final work measurement program was in place, presumably because the case analysts voluntarily began using the improved procedures as soon as they were developed in the seminars.

Within many organizations, introduction of work measurement and the process of setting standards can become a hotly contested labor-management issue and a major source of employee discontent. Where employees are not involved in standard setting, they may view a new standard as an unfair "speed up," an attempt by management to make them work harder for the same pay. Similarly, work simplification or procedural changes that are imposed from outside can be viewed as removing variety and autonomy from the job, and making it less interesting and more mechanical.

For example, the changes in work standards, evaluation, and pay that accompanied work monitoring for claims examiners prompted a unionization drive at Equitable Life Assurance. With the introduction of the measurement system, pay was changed from a straight salary to an incentive program that was based on performance. Examiners complained that they had to work much faster in order to make the equivalent of their old salaries. A few accepted transfers to lower paying jobs because they could not keep up the pace. The contract between Equitable and District 925 of The Service Employees International Union (SEIU), addresses some of the issues discussed in the section on "What Is Fair." Under the contract, employees now have access to their own performance records and a procedure for challenging records. Evaluations are based 80 percent on computer-based statistics and 20 percent on supervisors' judgments. In addition, the contract changed several other working conditions, such as leave policy, that had been a subject of dispute.

When electronic monitoring allows a complete record of each worker's performance, it becomes easier to pay workers based on their output. Some call this a revival of the "piece-rate" system and decry it as a form of worker exploitation. Often, however, performance does not translate into pay directly on a per-piece basis. For example, "incentive" plans pay a base rate for acceptable performance and bonuses for higher levels of performance.

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[26] James Hogg, "The Results of Technical and Professional Measurement in Insurance," in Proceedings, 1986 AOC Users Conference, May 15-18, 1986, Robert E. Nolan Co.; also, personal communication, May 29, 1986.

Incentive programs appear to be fairly common in data entry, where there is a wide range of performance.[27] Operators who are very fast can increase their income by 50 percent or more above the base rate, depending on how the incentive plan is structured. In some firms where standards are based on a predetermined-time method (i.e., so many keystrokes equal one standard hour of work), slower keyers can make bonuses if they are willing to work for a longer time. This also raises fairness questions and worker protection questions, for example, should employees feel pressure to skip lunch or breaks in order to improve their performance?

Incentive programs have also been used by employers to increase the performance of a group of employees. In one bank, for example, industrial engineers studied the work of check-proof reading operators and found that the engineered standard was far above the current level of achievement of the department. Rather than insist that operators begin to work to the new standard, management began to pay regular wages to those who met the old average and bonuses to all whose work approached the new standard. As departmental proficiency increases, the management expects to raise the standard and adjust the bonus structure to encourage even faster performance.[28]

The practice of "rate busting" or increasing performance standards over time is the basis for many objections to monitoring. Ever-increasing standards do not have to be related to incentive pay. Standards can rise due to new technology, revised productivity goals, or for other reasons that lead management to expect better performance from employees. In the well-publicized case of one data-entry center operated by the Internal Revenue Service, employees and their union were complaining about the stress resulting from the increased pace of work. In this instance, workers were seasonal, and were invited back to work again each year based on their previous year's performance. Since the number of available jobs had declined, only above-average keyers were invited back. However, performance standards were also raised yearly, presumably to deal with the workload. Thus, each keyer was required to make an increasingly greater effort to remain "above average."[29] An annual increase in standards has also been a cause of complaint among key entry operators in Dade County, Florida.[30]

Complaints about job stress in the U.S. Postal Service, which received a great deal of publicity in 1984 and 1985, were directed primarily at fast pace and high work standards rather than at automated equipment or the presence of monitoring per se.[31] Industrial engineers have noted since the beginning of the century that there is a limit to how much a pace can be increased, even if incentives are offered. Beyond a certain point the employees, either individually or as a group, will not perform any faster on a regular basis, no matter what the inducement. Tolerance for perceived unfair standards may depend on many factors, including the availability of other jobs. One case example noted that at three Internal Revenue Service Centers (where standards have been increased over the years), the turnover rates for key entry operators are very high; presumably workers left due to the heavy workload and fast pace required. However, the Wilkes Barre Service Center, located in an area of high unemployment, has a low turnover rate, but a high incidence of absenteeism.[32]

Quality of Work

One problem with computerized work monitoring is that it focuses mainly on quantity or speed of work. Although a well-designed work standard should allow workers time to do a good job, some standards require such a fast pace that workers feel quality must be sacrificed, or that the pressure to maintain both speed and quality leads to excessive stress. In a number of cases, for example, telephone operators have objected that the pressure to complete calls within the standard time prevents them from giving courteous, high-quality service. Some customers agree. On the other hand, because most operators are also subject to service observation (i.e., a supervisor sometimes listens in on calls to check for adherence to company procedures), they sometimes feel stressed because of the conflict between quantity and quality imperatives.[33]

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[27] Data Entry Management Association, "Sixth Annual Member Statistical-Compensation Survey," *DEMA Newsletter*, April 1985. The average rate for U.S. operators is 11,400 keystrokes per hour, but the fastest operators can do around 25,000.

[28] Interview with Work Measurement Manager of a southern bank.

[29] Alan Westin, "Privacy and Quality of Work Life Issues in Employee Monitoring," contractor report prepared for OTA, 1986; also John Harris, American Federation of Government Employees, personal communication, February 1986.

[30] "AFL-CIO Case Examples," November 1987.

[31] For example, Peter Perl, "Monitoring by Computer Sparks Employee Concerns," *Washington Post*, Sept. 2, 1984.

[32] "AFL-CIO Case Examples," November 1987.

In one mail order firm employee morale dropped and turnover rose to 80 percent after monitoring was introduced for VDT operators. "Everything was numbers," one executive recalled, with "no attention to the downtime and slow-response-time problems of the new system, or the changes in volumes operators faced during peak periods, or of the different length and complexity of customer orders." In addition, the pressure operators felt to speed up their work led to mistakes and improperly filled orders. This productivity system was scrapped after several years of operation, and replaced with a new approach that still collects individual operator statistics, but has standards geared to actual system operations and load cycles. In addition, as part of an overall "Quality First" campaign in this firm, the new performance standards stress "order quality" over "sheer numbers." Several dozen long-term employees interviewed for OTA said that the first productivity system was a "very bad time" at the company, but that the new approach is "fair to both company and employees," and they have no trouble in meeting both the quantity and quality standards.[34]

Quality evaluation often requires inspection by a human supervisor, but even here computer technology can be of assistance. Some office systems allow the supervisor to view on his or her screen whatever transactions are taking place on an employee's screen. Thus supervisors can view transactions as they are taking place to check them for correctness. Computerized letter-sorting equipment used by the U.S. Postal Service has similar capability, so supervisors can periodically check each worker to be sure he or she is keying in proper zip codes.

For telephone service workers, quality checks are made by supervisors who listen in on calls to check that employees are courteous, are using proper procedures, and are giving correct information. Correct information is of interest to many firms whose representatives deal with the public, because employers may be held liable for information their employees give out over the telephone or for actions taken as a result of telephone conversations. In some cities "911" emergency calls or utility company "trouble" calls are recorded so that there will be a record of time, address, or other information for possible future use.

In some organizations employees know when their supervisor is listening, either because there is a drop in volume or because a beep tone is heard. In other cases, the monitoring equipment is completely silent. One organization was so concerned that employees not know when the supervisor was listening that supervisors were required to wear their headsets all day so that employees would not be able to guess whether they were listening or attending to other duties.

In some firms quality assurance is considered such an important function that a separate department handles it. At American Express, for example, customer service supervisors listen in on calls on an regular basis and rate the quality based on established criteria. In addition, a separate quality assurance worker listens in on calls of employees in any unit. Results are always discussed with the employee within a short time after the call.

Some workers object to service observation precisely because it is not necessarily objective. Some firms, in fact, do not have firmly established criteria for how often to listen or how to rate quality. At one government agency there were even stories of service observation being used punitively—i.e., a supervisor listened to certain workers almost constantly, in order to accumulate enough mistakes to discipline them. This would clearly seem to be an abuse of service observation.

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[33] "AFL-CIO Case Examples," November 1987.

[34] Alan Westin, "Privacy and Quality of Work Life Issues in Employee Monitoring," contractor report prepared for OTA, 1986, p. 72.

Service observation also invokes feelings of invasion of privacy, even though the conversation involved is not really a private one. One operator interviewed for OTA said, "When they are listening to me, I'm very upset because you can't stop it."[35] The privacy aspect applies more clearly to the customer's side of the conversation. Some people may object to third parties overhearing their conversations. Two States, West Virginia and California, attempted to legislate restrictions on service observation. The West Virginia law required a beep tone when the supervisor is on the line as well as a published notice to customers that calls might be observed. This law was passed in 1983 but repealed in 1986. A similar law was passed in the California legislature but was vetoed by the Governor.

In the case of West Virginia there is evidence that both operator productivity and customer satisfaction remained high during the period when "secret" service observation was not permitted.[36] However, several employers, particularly AT&T objected to the legislation. AT&T's threat to build its new credit management center in another State was instrumental in the repeal of the West Virginia monitoring law.[37]

Job Design and Work Process

As discussed in greater detail in OTA's report *Automation of America's Offices*, new information technologies sometimes offer firms more flexibility in the way office work is designed. While many firms use computers to continue or intensify the assembly line working conditions of the industrial style of work organization, some others have experimented with new forms of organization that reinvest the jobs of individual workers or teams with more variety and responsibility.[38]

Some of these experimental organizations make use of what is called a semi-autonomous work group—a team of workers who are responsible for not only doing the work, but managing some aspects of their own work as well. In these cases, work monitoring data may still be collected, but is used by the work group as a tool for assessing its own progress.

One well-publicized example is the HOBIS (Hotel Billing Information System) office at Tempe, Arizona, in an experiment worked out jointly by AT&T and the Communications Workers of America (CWA) in 1982.[39] This office of 100 operators was reorganized according to the autonomous work group principle. It had no first-line supervisors and only one second-line supervisor in the role of advisor. Operators assumed the responsibility of supervisors, rotating through administrative duties.

The employees changed the traditional work monitoring practices. They eliminated individual measurement and remote secret service observation. Average work time (AWT) was measured only for the whole group. Service observation was performed by small groups of peers by the old-fashioned "jack-in" method, where the observer sits beside the person being monitored, listens to a few calls and then discusses the results with the employee.

It was generally agreed by CWA and AT&T that the Tempe experiment was a success: total office AWT was equal to or better than that of traditionally supervised HOBIS offices;

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[35] Michael J. Smith, Pascale Carayon, and Kathleen Miegio, "Motivational, Behavioral, and Psychological Implications of Electronic Monitoring of Worker Performance," contract report prepared for OTA, July 1986.

[36] "Results Summary, Key Service Indicators," C&P Telephone Co. of West Virginia as of Sept. 11, 1985, supplied to OTA by Communications Workers' of America.

[37] Testimony of John D. Landers, AT&T, before the Judiciary Committee, West Virginia House of Representatives, Feb. 12, 1986.

[38] U.S. Congress, Office of Technology Assessment, *Automation of America's Offices*, OTA-CIT-287 (Washington, DC: U.S. Government Printing Office, December 1985), ch. 4.

[39] This description is based on Ronnie Straw and Gregory Nichlas, "Office Automation and Autonomy: A Comparison of Choices," Communications Workers of America, 1985; Alan Westin, "Privacy and Quality of Work Life Issues in Employee Monitoring," contractor report prepared for OTA, 1986; Thomas Taylor, Mountain Bell Telephone, telephone interview, Apr. 16, 1986.

there were fewer customer complaints; the employee grievance rate was lower and absenteeism was lower. In addition, there were considerable savings in management salaries, and some of the money was spent on training for employees. The Tempe office was closed shortly after the AT&T divestiture for reasons completely unrelated to the experiment. Other joint labor-management experiments in alternative methods of work organization are being sponsored by CWA, AT&T, and some of the local telephone companies. For example, further experiments with semi-autonomous work groups are being carried out among AT&T operator groups in Columbus, Ohio, and south-central Florida.[40]

In a financial services firm interviewed by OTA, autonomous work groups were also considered successful. Workers were taken out of "functional" areas and organized into teams servicing the needs of certain large clients or client groups. Employees "cross-trained" one another in different jobs so that each could do a variety of work and understand the whole process. The group met together to establish productivity goals. Although this firm maintained a more traditional management structure within each group and still applied individual measurement to some jobs, officials and employees believed that the reorganization, teamwork, and greater diversity of work greatly improved both productivity and quality of working life.[41]

Supervision and Evaluation

A few researchers have attempted to compare how perceptions of closeness of supervision, emphasis on performance measures, and job satisfaction differ in monitored and nonmonitored workers. This is a difficult task because so many other cultural, job design, and environmental factors can overshadow the effect of electronic monitoring.

One researcher who studied data-entry operators, claims processors, and data collectors (telephone interviewers and collection agents) and their supervisors, found no significant pattern of differences between the monitored and nonmonitored sites.[42] The differences she did notice were between unionized and non-unionized locations. The workers in unionized locations were better informed about VDT health issues and more willing to ask questions and state opinions during informal workshops held after their survey forms were complete. She found, however, their concerns encompassed a variety of VDT health issues, including vision problems, workstation design, and reproductive hazards; monitoring did not emerge as the major focus of concern.

Another study found that in both monitored and nonmonitored sites, roughly half the workers (47.8 and 46.3 percent respectively) expressed satisfaction with the evaluation process.[43] Among the monitored workers, 17.3 percent were not satisfied and 34.7 percent were neutral. Among the nonmonitored workers, 28 percent were not satisfied and 25 percent were neutral (see table 5). In reviewing the supplementary comments made by interview subjects, the authors found clear differences in the causes of dissatisfaction. At the monitored sites, nearly all dissatisfaction was directed at the electronic monitoring system; at the nonmonitored sites it was directed at a number of causes, including supervisors, lack of standards, unfair evaluations, and the like.

This study also found that workers at monitored sites tended to believe that their evaluations overemphasized quantity and underemphasized quality, tended to see their rewards as closely tied to their evaluations, and thought that level of supervision was too close. The majority of workers in both groups felt they had little participation in workplace de-

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[40] Communications Workers of America and AT&T Communications, *The Emergence of Second Generation Quality of Work Life Models in AT&T Communications: A Pilot Study*, February 1986.

[41] OTA interviews, November 1985.

[42] Elaine J. Eisenman, "Employee Perceptions and Supervisory Behaviors in Clerical VDT Work Performed on Systems That Allow Electronic Monitoring," prepared for Educational Fund For Individual Rights and submitted as a contract report to OTA, 1986.

[43] R.H. Irving, C.A. Higgins, and F.R. Safayeri, "Computerized Performance Monitoring Systems: Use and Abuse," *Communications of the ACM*, August 1986.

Table 5.—Comparison of Monitored and Nonmonitored Workers

Dimension	Monitored	Percent	Not monitored	Percent	Total	Chi-Sq	(df)	(p)
Satisfaction:								
Not satisfied	8	17.3	23	28.0	31			
Neutral	16	34.7	21	25.6	37			
Satisfied	22	47.8	38	46.3	60			
Total	46		82		128	2.25	2	p=0.3247
Emphasis on performance measures:								
Quantity:								
Underemphasized	0		16	20.2	16			
Appropriate	19	38.0	45	56.2	64			
Overemphasized	31	62.0	19	23.7	50			
Total	50		80		130	23.79	2	p=0.001
Quality:								
Underemphasized	22	44.0	15	20.2	37			
Appropriate	19	38.0	45	56.2	64			
Overemphasized	5	8.3	1	1.4	6			
Total	50		74		124	15.3	2	p=0.0005
Characteristics of feedback:								
Amount of feedback:								
Not enough	21	42.8	41	45.0	62			
Enough	22	44.8	41	45.0	63			
Too much	6	12.4	9	9.8	15			
Total	49		91		140	0.20	2	p=0.9048
Usefulness of feedback:								
Not useful	8	17.0	13	14.2	21			
Adequate	13	27.6	20	21.9	33			
Useful	26	55.3	58	63.7	84			
Total	47		91		138	0.93	2	p=0.6281
Importance of evaluation for rewards:								
Not important	2	4.3	18	22.2	20			
Marginal importance	3	6.5	8	9.8	11			
Important	41	89.1	55	67.9	96			
Total	46		81		127	8.08	2	p=0.0176
Closeness of supervision:								
Not close	16	32.6	38	41.7	54			
Acceptable	10	20.4	36	39.5	46			
Too close	23	46.9	17	18.6	40			
Total	49		91		140	13.14	2	p=0.0014
Participation in evaluation process:								
Low participation	30	65.2	50	62.5	80			
Average	8	17.3	11	13.7	19			
High participation	8	17.3	19	23.7	27			
Total	46		80		126	0.84	2	p=0.6570

SOURCE: R.H. Irving, C.H. Higgins, and F.R. Safayeni, "Computerized Performance Monitoring Systems: Use and Abuse," *Communications of the ACM*, August 1986, p. 796.

cisions. This study found little evidence that workers opposed computer monitoring in principle; their chief problems were not with the technology itself but with the way it was used by management.

Personal Computer Monitoring

Most electronically monitored work is performed on workstations attached to mainframes or minicomputers. Yet personal computer (PC) use is growing rapidly, especially among professional and managerial workers. OTA did not find examples of production monitoring of workers using PCs, but there was considerable interest and controversy over privacy of an employee's PC files and the right of employers to inspect them.

Three primary areas of employer interest in PC monitoring have already surfaced:

1. abuse of PCs (using company resources for personal purposes),
2. confidentiality (security breaches), and
3. violation of legal/regulatory duties in use of client or employee data.

Of the 10 firms interviewed for OTA regarding PC monitoring, none were doing any inspections or searches of PC-user disks or files. All of them, however, said they felt they had the legal right to do so, and would not hesitate to do so if a specific rule violation or compromise were suspected. A typical comment by one information system director was:

> We have issued a policy guide for privacy and security compliance in PC use, and have stated that the company reserves the right to inspect all PC files and materials bought by the company and used here for our business purposes. But we haven't felt it wise or necessary to swoop down on people and demand to see what they have on their disks.

On the other hand, representatives of *all* 10 firms said their organizations audited transactions done by PCs interacting with databases on other computers. These were part of the regular, user-password-based security procedures of mainframe/database management. The monitoring consisted of: 1) following up on any unusual use patterns indicated in regular audit-trail records; or 2) ad hoc inspections of audit records to identify use levels and patterns. End users are informed (in all the organizations) that such auditing is conducted.

As for assuring end-user compliance with legal and regulatory rules governing an organization's handling of client or employee personal data, 4 of the 10 organizations reported they had issued written policies to PC end-users restating such requirements (e.g., Fair Credit Reporting Act; State employee access to personnel records laws; confidentiality of medical information laws; etc.). However, none of the 10 firms reported having done surprise or announced inspections of disks or other deskheld file materials. Interviews with officials of the Inspector General's office of General Services Administration (GSA) indicate that inspectors from GSA and other agencies' Inspector Generals have inspected PC disks of government employees. These audits have been done both to determine that computers are being used for official purposes and to ensure that confidential information is being properly used and properly protected.[44]

Monitoring and Stress[45]

One area in which electronic monitoring may have far-reaching implications is in the area of health effects. A number of authors have noted the likelihood of a link between electronic monitoring and physical and psychological stress. Many of the published stories of oppressive, heavily monitored workplaces cite the overwhelming fear, anxiety, hatred, and loss of self-image that workers suffer. Many authors have stated that there must be a link between monitoring, stress and health problems, absenteeism, and lowered productivity.[46]

Stress is now recognized as a major occupational health problem. Stress-related symptoms have been estimated to cost U.S. industry $50 to $75 billion per year in absenteeism, company medical expenses, and lost time.[47] Statistics indicate that claims for worker compensation, based on disability due to gradual accumulation of stress, have been growing rapidly during the 1980s.[48] For workers under age 40, claims related to stress exceeded claims related to other occupational disease in 1985.[49] These claims are from workers of all kinds, including managers and supervisors, who are less likely than other workers to file claims for physical injuries. To the extent that electronic monitoring is associated with stress, then it must be viewed as contributing to an important health hazard.

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[44] Interview with Don Sheridan, Office of Inspector General, General Services Administration, Dec. 16, 1986.

[45] This section draws heavily from Michael J. Smith, Pascale Carayon, and Kathleen Miezio, "Motivational, Behavioral, and Psychological Implications of Electronic Monitoring of Worker Performance," contractor report prepared for OTA, 1986.

[46] See, for example, Tim Healy and Peter Marshall, "Big Business is Watching You," *In These Times*, Feb. 26-Mar. 11, 1986; Arlene Hershman, "Corporate Big Brother is Watching You," *Dun's Business Month*, January 1984; Robert Howard, *Brave New Workplace* (New York, NY: Elizabeth Sifton Books-Viking, 1985); Peter Perl, "Monitoring by Computers Sparks Employee Concerns," *The Washington Post*, Sept. 2, 1984; Peter Perl, "Watching the Workplace: High Tech Methods Boost Productivity, But at a Cost," *The Washington Post*, Sept. 3, 1984.

[47] Robert Arndt and Larry Chapman, "Potential Office Hazards and Control," September 1984, report prepared for OTA project on Preventing Illness and Injury in the Workplace, p. 30.

[48] National Council on Compensation Insurance, "Emotional Stress in the Workplace—New Legal Rights in the Eighties," 1985.

According to the view most frequently cited in the literature, the presence of stress can be inferred in an individual from a very generalized physiological response pattern.[50] Symptoms include increases in adrenaline secretion, the dumping of sugar into the bloodstream, and other related physiological processes. These symptoms can be provoked by a variety of environmental agents and situations, such as drugs, fear, and job ambiguity. While there is nothing wrong with physiological arousal per se, it can, if chronic, produce serious degenerative effects due to wear and tear on the body. Thus, stress provides a basis for the development of various illnesses called "diseases of adaptation," since they are not a direct function of the agent or situation that elicited the response pattern, but a consequence of the body's adaptive reaction.

A 1982 journal article suggests that job factors can create stress and lead to chronic disorders.[51] The author states that individuals may perceive the demands imposed by the environment as either stressful or not stressful, depending on factors such as prior experience, current emotional status, health status, and genetically predisposing features. If demands are perceived to be stressful, then acute biological and emotional responses occur, which, if they continue to occur with some consistency over a prolonged period of time, can eventually lead to disease. Various intervening factors, which determine the potential for disease to develop, include individual coping style, genetic predisposition to disease, and emotional support from others.

Although there has been some research on the health effects of office automation, there has been little research attempting to draw a direct link between electronic monitoring and stress. There are theoretical grounds for postulating a link between monitoring and stress, and the few studies that have been done suggest that monitoring may be stressful. Unfortunately, none of these studies have successfully separated the effects of computer-based monitoring from the combined effects of other stressors.

Although there is no clear scientific validation of a link between electronic monitoring and stress, several surveys have found higher incidence of stress among people in monitored jobs. One survey that attempted to look directly at stress and health outcomes of work monitoring was the 1984 National Survey on Women and Stress, conducted by the 9 to 5 National Association of Working Women. As noted above, this survey includes one question directly related to monitoring: "Is your work measured, monitored, 'constantly watched' or 'controlled' by machine or computer system?" When the health problems experienced by women who answered "yes" to this question are compared to those of all respondents, as shown in table 6, they show a consistently higher experience of stress-related illnesses. Respondents whose work was subject to computerized monitoring were also more likely to rate their jobs as "very stressful." Forty nine percent of them rated their jobs as very stressful, compared to 33 percent of all respondents. Seventy-four percent of the monitored workers reported strain, stress, or pressure "often or always" in the previous month, compared with an overall rate of 63.5 percent for all respondents.[52]

A related question in the 9 to 5 survey asked about production quotas. Almost half (47.4 percent) of the women working under production

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[49] Ibid.

[50] Hans Selye, *The Stress of Life* (New York, NY: McGraw-Hill, 1956).

[51] L. Levi, "Methodology Considerations in Psychoendocrine Research," *Acta Medica Scandinavia*, 1982, 191, Supplement 528, pp. 28-54.

[52] 9 to 5 National Association of Working Women, "The 9 to 5 National Survey on Women and Stress—Office Automation: Addendum," 1984, pp. 4-5.

Table 6.—Rates of Frequent Health Problems Related to Computerized Monitoring of Work Performance

Respondents answering the question: "Is your work measured, monitored, constantly watched, or controlled by machine or computer system?"	Health problems experienced two to three times per week or more/daily								
	Headaches	Nausea, dizziness	Exhaustion, fatigue	Digestive problems	Chest pain	Anxiety, nerves	Anger	Depression	Medical problems
Yes (358 of all respondents)	31.0%	9.83%	49.40%	25.9%	9.75%	40.34%	39.20%	32.2%	40.5%
No (1,705 responses)	24.7	5.54	38.33	17.8	5.40	31.15	28.44	20.0	32.0
Rate for all respondents	24.2	6.70	39.70	19.0	5.60	31.90	28.50	20.8	31.6
Chi square probability ratio	0.0201	0.0033	0.0001	0.0008	0.0333	0.0001	0.0001	0.0001	0.0019

SOURCE: Nine to Five National Association of Working Women. The Nine to Five National Survey on Women and Stress: Office Automation Addendum, 1984.

Table 7.—Rates of Frequent Health Problems Related to Production Quotas or Productivity Standards

Respondents answering the question: "How often does the following statement describe your job? I am required to complete a certain amount of work per hour or per day, e.g., a certain number of keystrokes, forms, or items to process."

Health problem two to three times per week or more/daily	All respondents	Never (3,135)	Sometimes (761)	Often (334)	Always (443)	If ever (1,531)
Eyestrain	20.2%	17.8%	23.3%	23.4%	27.4%	25.0%
Headaches	24.0	22.3	25.3	28.0	28.7	27.14
Nausea/dizziness	6.2	5.6	6.5	7.6	8.9	7.4
Insomnia	17.6	15.4	21.5	20.9	24.2	22.1
Muscle pain	38.6	35.5	42.6	45.2	49.3	43.2
Exhaustion/fatigue	39.7	35.7	44.4	47.6	56.0	48.4
Digestive problems	18.8	16.7	20.8	22.8	26.8	23.0
Chest pain	5.7	4.4	7.0	7.8	10.9	8.3
Nerves, tension, anxiety	31.2	28.0	34.3	39.1	41.8	37.7
Anger/irritability	27.4	24.7	30.3	32.5	37.6	32.9
Depression	20.0	16.7	24.3	29.3	28.7	26.6
Medical problems	31.6	29.9	34.7	34.4	36.3	35.1
Lost work time	20.9	19.3	23.4	24.1	25.4	24.1

Base is all currently employed respondents.

SOURCE: Nine to Five National Association of Working Women. The Nine to Five National Survey on Women and Stress: Office Automation Addendum, 1984.

standards reported that their work was measured or monitored by a computer. For the others, work is presumably counted by supervisors or by the workers themselves. Women working under production standards were more likely to rate their jobs as very stressful (48.1 percent if always under standards, 41 percent if often, 29.2 percent if never). Their experience of stress-related illness, as shown in table 7, was higher than the experience of all respondents.[53]

These results are consistent with other research suggesting that monitoring induces pressure to perform. Some managers may feel that this is a desirable effect, since it implies high production. But occupational stress research indicates that excessive work pressure is not conducive to good long-term performance and brings about adverse health consequences.[54] In fact, there are a range of stressful working conditions that may be related to electronic monitoring of employee performance. These include heavy workload, especially of repetitive or machine-paced tasks; routinized work activities; lack of control over timing, speed, and variety of tasks; and social isolation, including lack of peer social support, reduced supervisory support, and fear of job loss.

There are many potential causes of stress in the workplace, and it is not clear from worker compensation claims that work monitoring is a dominant one. However, a review of mental stress worker compensation claims from the State of Oregon shows that a little under one-fifth of the total claims were made by people in occupations where monitoring is common. Worker compensation records do not release the detailed cause of injury or the detailed job description of the claimant, so it is impossible to determine if electronic monitoring was actually a factor. Of the 542 cases listed, about 102 (18.8 percent) were in occupations where electronic monitoring is fairly common. These occupations include clerks (of various kinds), insurance adjustors, bank tellers, telephone operators, dispatchers, and retail sales workers. The rate of acceptance and denial of claims is shown in table 8. The acceptance rate for potentially monitored office occupations was roughly the same as for all jobs, 34.2 and 35.2 percent respectively.

Other studies have found a high incidence of stress-related illness among workers most likely to experience electronic monitoring, even though monitoring itself was not examined as a variable. For example, a study by the National Institute of Occupational Safety and Health found that secretaries had the second-highest incidence of stress-related illness among 22,000 workers. The Framingham heart study, released in 1985, found that women clerical workers develop coronary heart disease at nearly twice the rate of other women workers.[55] Researchers have commented that the stress-provoking factors in these jobs are rapid work pacing, including machine pacing, monotonous or repetitive work, and lack of discretionary control.

Table 8.—Review of Oregon Worker Compensation Claims Involving Mental Stress January 1985 Through September 1986

Occupations	Number of claims	Accepted	Percent accepted	Denied
All occupations	542	191	35.2	351
Possibly monitored occupations:				
Office[a] (percent of total 13.4)	73	25	34.2	48
Retail sales (percent of total 5.3)	29	11	37.9	18

[a] Occupations, in order of decreasing frequency, are: clerk (39), insurance adjustor (10), dispatcher (9), administrative support (5), computer operator (4), data entry (2), bank teller (2), telephone operator (2).

SOURCE: Oregon Worker's Compensation Department, Research and Statistics Section, "Accepted and Denied Claims Involving Mental Stress, Oregon, 1/85-9/86."

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[53] Ibid.

[54] C.L. Cooper and J. Marshall, "Occupational Sources of Stress: A Review of the Literature Relating to Coronary Heart Disease and Mental Ill Health," *Journal of Occupational Psychology* 49, 1976, pp. 11-28.

[55] Working Women Education Fund, "Health Hazards for Office Workers," April 1981.

Time pressure, such as having to meet deadlines, is another significant factor in stress. Studies have shown increases in stress level as difficult deadlines draw near.[56] The experience of deadline pressure on a constant basis, as might be the case in a fast-paced monitored job, may be more damaging than deadline pressure experienced on an occasional basis.

Two organizational factors have been shown to be of special significance for increased job stress and decreased worker health. These are: 1) job involvement or participation; and 2) organizational support, as reflected by supervisory style, support from managers, and chances for career development. Lack of participation in work activities has been demonstrated to result in increases in negative psychological moods.[57] In terms of organizational support, it has been shown that close supervision and a supervisory style characterized by constant negative performance feedback are related to high levels of stress and poorer worker health.[58] The implication of these findings is that excessive, impersonal electronic monitoring of employee performance that produces close supervision and constant negative performance feedback could promote worker stress.

It has also been demonstrated that workers' feelings of lack of involvement are related to stress and that prolonged stress can be related to health complaints.[59] Electronic monitoring has a propensity for reducing worker feelings of job involvement and may in this way increase worker distress. The chances to participate and be involved in the job process may be diminished in work systems that are driven by employee performance monitoring.

Reduced coworker support can also contribute to stress. Monitored workers in several studies, and those interviewed by OTA stated that, due to their production standards and the electronic monitoring system, they had no opportunity to interact with coworkers.[60]

One study of work monitoring in the telecommunication industry suggests that the possible connection between monitoring and job-related stress is through the changed structure of the work. In this study, no direct correlation was found between electronic monitoring and stress-related illness. However, a correlation was found between monitoring and low job control which has been found, in other studies, to be associated with stress-related illness. The conclusion reached by the researchers is that when jobs are redesigned to facilitate computerized monitoring of work performance, they are also reshaped in ways that increase the degree to which management directs both the pace and the method of work.

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[56] M. Friedman, R.H. Rosenman, and V. Carroll, "Changes in the Serum Cholesterol and Blood Clotting Time in Men Subjected to Cyclic Variation of Occupational Stress," *Circulation*, 1958, pp. 852-861.

[57] B. Margolis, W.M. Kroes, and R. Quinn, "Job Stress: An Unlisted Occupational Hazard," *Journal of Occupational Medicine* 16, 1974, pp. 654-661. R.D. Caplan, S. Cobb, J.R.P. French, R.V. Harrison, and S.R. Pinneau, *Job Demands and Worker Health* (Washington, DC: U.S. Government Printing Office, 1975). M.J. Smith, B.G. Cohen, and L.W. Stammerjohn, "An Investigation of Health Complaints and Job Stress in Video Display Operations," *Human Factors* 23, 1981, pp. 387-400.

[58] R.D. Caplan, S. Cobb, J.R.P. French, R.V. Harrison, and S.R. Pinneau, *Job Demands and Worker Health* (Washington, DC: U.S. Government Printing Office, 1975). M.J. Smith, B.G. Cohen, and L.W. Stammerjohn, "An Investigation of Health Complaints and Job Stress in Video Display Operations," *Human Factors* 23, 1981, pp. 387-400.

[59] World Health Organization, *Psychosocial Factors and Health: Monitoring the Psychosocial Work Environment and Workers' Health* (Geneva: 1984). J. Rutenfranz, W. Colquhoun, P. Knauth, and J. Ghata, "Biomedial and Psychosocial Aspects of Shiftwork," *Scandinanvian Journal of Work Environment and Health* 3, 1977, pp. 165-182. R.A. Karasek, Jr., "Job Decision Latitude, Job Design, and Coronary Heart Disease," in G. Salvendy and M.J. Smith (eds.), *Machine Pacing and Occupational Stress* (London: Taylor & Francis, 1981), pp. 45-56. R.D. Caplan, S. Cobb, J.R.P. French, R.V. Harrison, and S.R. Pinneau, *Job Demands and Worker Health* (Washington, DC: U.S. Government Printing Office, 1975). M.J. Smith, B.G. Cohen, and L.W. Stammerjohn, "An Investigation of Health Complaints and Job Stress in Video Display Operations," *Human Factors* 23, 1981, pp. 387-400. B. Gardell, "Technology Alienation and Mental Health," *Acta Sociologica* 19, 1976, pp. 83-94. B. Margolis, W.M. Kroes, and R. Quinn, "Job Stress: An Unlisted Occupational Hazard," op. cit. S.G. Haynes and M. Feinleib, "Women, Work and Coronary Heart Disease: Prospective Findings From the Framingham Heart Study," *American Journal of Public Health* 70, 1980, pp. 133-141. M.J. Colligan, J.J. Smith, and J.J. Hurrell, "Occupational Incidents Rates of Mental Health Disorders," *Journal of Human Stress* 3, 1977, pp. 34-39.

[60] For example see R.H. Irving, C.A. Higgins, and F.R. Safayeri, "Computerized Performance Monitoring Systems: Use and Abuse," *Communications of the ACM*, August 1986. Interviews in Michael J. Smith, Pascale Carayon, and Kathleen Miegio, "Motivational, Behavioral and Psychological Implications of Electronic Monitoring of Worker Performance,," contract report prepared for OTA, July 1986.

This lack of personal control, in turn, places workers at significantly greater risk of ill health.[61]

Computer Pacing and Stress

Machine pacing is different from computer monitoring. The work of a directory assistance operator offers an example of a "low control job," one that is both paced and monitored by computer. A computer-controlled distribution system passes a call to an operator. He or she greets the customer, hears the name to be looked up, and keys it into a computer terminal. Once the proper information appears on the screen, the operator presses a key to release the call. A voice synthesizer actually reads the telephone number to the customer. Once the call is released, the distribution system presents another call to the operator.

The job is *monitored*, in that records are kept on the operator's performance within each call—the time to respond to the call, locate the proper information, and release the call (summarized as average work time or AWT). In addition, the job is also *machine paced* in that the cycle time between calls is controlled by the computer, not by the operator. Work pressure increases if that cycle time is very short.

It has been noted that new technology has turned the job of directory assistance operator into a literally thankless task. Not only is the pace hectic, but because the operator releases the call before the customer receives the needed information, the operator never hears customers say "thank you." Job design factors, along with the fast pace, probably greatly contribute to stress in this job.

Machine pacing has been implicated as a significant factor in ill-health among factory workers. Computers—which can operate at high speeds on a continuous basis—have increased the pacing impact on office workers. Recent research suggests that pacing produced by computer-driven video display systems may have an even greater stress effect than traditional factory pacing.[62]

Feedback and Motivation[63]

Perhaps the best use of information about an employee's performance is to give it back to the employee. One advantage that electronic measurement can offer to workers is accurate and timely information about their own performance. Studies of feedback, whether related to simple sensory feedback or to higher levels of feedback related to knowledge of results, all indicate that people want to know about their performance and will seek out such knowledge when it is absent.[64]

Immediate sensory feedback helps employees to exert better control over skilled actions and to correct errors.[65] For example, the feel of the keyboard and the display of the characters on the video screen help a data entry or word processing operator to know that data is being keyed properly. This type of feedback is continuous throughout the task.

A higher level of feedback, knowledge of results, occurs when a task is completed and evaluated against some external standard, and the results are fed back to the employee; "You have produced 10 percent over the production goal today," or "Your output had 2 percent errors." This kind of feedback provides direction to the worker about future output.

Feedback about one's own activities can be a very powerful motivator and has been found to have a strong influence on productivity, and in some cases on job satisfaction as well. People like to do a good job, but without information they often don't know whether they are doing one or not.

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[61] Steven P. Vallas and William V. Calabro, "Occupational Conditions and Worker Health in the Communications Industry," New York Institute of Technology, Human Resources Development Center, no date.

[62] M.J. Smith, B.G. Cohen, and L.W. Stammerjohn, "An Investigation of Health Complaints and Job Stress in Video Display Operations," *Human Factors* 23, 1981, pp. 387-400. A. Cakir, H. Reuter, L. Von Schmude, and A. Armbruster, *Investigations of the Accommodations of Human Psychic and Physical Functions to Data Display Screens in the Workplace* (Berlin: Institute fur Arbeitswissenscharft der Technician Universitat Berlin, 1978).

[63] This section draws heavily from Michael J. Smith, Pascale Carayon, and Kathleen Miegio, "Motivational, Behavioral and Psychological Implications of Electronic Monitoring of Worker Performance,," contract report prepared for OTA, July 1986.

[64] S.J. Ashford and L.L. Cummings, "Feedback as an Individual Resource: Personal Strategies of Creating Information," *Organizational Behavior and Human Performance* 32, 1983, pp. 370-398.

[65] K.U. Smith and M.R. Smith, *Cybernetics Principles of Learning and Education Design* (New York, NY: Holt, Rinehart & Winston, 1966).

Because computer technology is adept at gathering and correlating information, it can be very useful in giving timely feedback to workers in a useful form. For example, office systems can be designed to give performance information to workers as well as to supervisors. In some firms, for example, customer service representatives can get private access to their own recent performance by keying the proper code into their workstations.[66] Any information that is available to their supervisor is available to the individual workers, as well as comparisons with the group average and the standards.

A recent study reviewed 42 case histories and found that without exception people performed better when they were given some objective, quantitative feedback about their own performance or output. This study did not focus on electronic work measurement, but rather on both manual and electronic methods in a variety of work settings, including banks, payroll offices, reservation offices, manufacturing facilities, and health care facilities. The form in which feedback was given also varied from one setting to another. The three methods most commonly used were private individual feedback, public individual feedback, and public group feedback. In some cases, objective feedback was combined with other interventions such as praise, public recognition, or additional training; but positive results were also noted where feedback alone was provided.[67]

Feedback may serve as both a motivator and an instructional device. When people receive what they perceive as objective feedback, they can compare what they actually did to: 1) what they thought they did and 2) what they are expected to do. In some cases it may correct misconceptions or inaccurate perceptions about what they are doing. In one example, airline reservation clerks were provided with profiles of their verbal behaviors based on sample recordings of their telephone conversations with customers. One clerk commented on seeing the feedback:

> When asked previously whether I used the customer's name I would have said—and believed—"Of course, we were trained to do that." I was really surprised when I saw objective evidence on how little I was actually doing it.[68]

As a result of the feedback, use of the customer's name by the clerks rose by 87.5 percent, while the clerks' interrupting of customers (a habit the employer wished to discourage) nearly disappeared.

Feedback is an effective modifier of behavior if it is seen as a valued commodity by the recipient and if it is timely. It takes on value to the individual when it is effective (relevant, understandable, accurate, useful) and when it comes from a trusted or highly regarded source. Although feedback need not be immediate or continuous, it should be given frequently. The longer the delay, the less effective it is in affecting performance.[69] A number of the workers interviewed for OTA expressed a desire for more frequent feedback about their work. They also thought that feedback information from the electronic monitoring system could be better designed to help them gain more control of their work.

If employees perceive that rewards and/or punishments could ensue from an evaluation of their performance, they are especially interested in feedback. They want to understand the basis of rewards and punishments, and feedback helps to resolve feelings of ambiguity or uncertainty.

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[66] Interviews at American Express Southern Regional Operations Center.

[67] Richard E. Kopelman, *Managing Productivity in Organizations: A Practical, People-Oriented Perspective* (New York, NY: McGraw Hill, 1986), pp. 163-187.

[68] Ibid., p. 176, citing Stephen A. Allen, "Aer Lingus—Irish (B)" case #9-477-640 (Boston, MA: Intercollegiate Case Clearinghouse, 1976), p. 7.

[69] M.J. Smith, B.G. Cohen, and L.W. Stammerjohn, "An Investigation of Health Complaints and Job Stress in Video Display Operations," *Human Factors* 23, 1981, pp. 387-400.

At the same time, feedback of performance can create feelings of anxiety, frustration, and lowered self-esteem. Since feedback fulfills an error-correction function as well as a performance-appraisal function, it can indicate to employees that they are not doing their job as well as they would like to, or as well as the employer would like them to. This can create stress, even when it resolves the stress associated with uncertainty and ambiguity. In short, feedback is a two-edged sword insofar as stress is concerned.

Feedback is necessary to groups as well as individuals, and computer monitoring systems can also give workers immediate information about the work environment letting them know how their work group is doing right now, and how they can best contribute.

To take telephone customer service again as an example, some offices have clearly visible displays on the wall that show the number of incoming telephone calls waiting to be answered and the age, in seconds, of the oldest call. Such displays could be used as weapons of callous management to keep constant pressure on agents of understaffed offices. However, in a properly staffed office, where peaks of incoming calls occur for a few minutes at a time, a few times a day, status displays become tools in the hands of the work group. People know how to pace their work. When the display shows all zeros, agents feel freer to take a little extra time with a difficult caller, to catch up on paper work, or to take a break. When many calls are backed up, they can make an extra effort to finish a call quickly, or perhaps to defer a break for a few minutes rather than abandon their colleagues in a crunch.

Team spirit and friendly competition can be powerful motivators, and both employers and employees can benefit if they are not abused. However, workers can also perceive employers' use of feedback and social pressure to be unfair and manipulative. A Pacific Western Airlines (PWA) productivity campaign drew union protests when company posters urged reservation clerks to:

> Compare yourself with your friends. Compare yourself with ones who aren't your friends. Are you pulling your weight at the office? When the monthly statistics are published, ensure you're not dragging down your team and your office.

The union newsletter charged PWA with setting workers against each other, and called the campaign a "new low in . . . degradation."[70]

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[70] Lawrence Archer, "I Saw What You Did and I Know Who You Are," *Canadian Business*, November 1985, p. 81.

THE FUTURE OF WORK MONITORING

The OTA report on *Automation of America's Offices* pointed out some trends in the growth of computer-based office automation equipment that have implications for the future of work monitoring.

One trend was the inevitable movement toward direct machine-to-machine communication. Increasingly, data will be captured in machine-readable form at the point of origin, customers will enter their own data (as with automatic teller machines) information will be recorded using optical scanning and voice recognition, and different computer systems will talk directly to each other, thus reducing the need to keyboard data.

Another trend was the growth in the introduction and use of office automation equipment and its rapid adoption by all sectors of the economy. It is estimated that by the year 1990 there will be one computer terminal for every three workers in the United States; by the year 2000, terminals may be as common in offices as telephones.

Both of these trends suggest possible changes in the population of workers that will be affected by computer-based work-monitoring technology. For example, the prime example of the monitored job today is that of the data-entry operator, but over the next 20 years the growth rate of data-entry workers is expected to slow or perhaps decline. Those that remain will probably still be monitored, but they will be a smaller proportion of the office work force.

The other trend—towards wider use of computer-based office equipment—suggests that more jobs will be at least partly automated or dependent on the use of a computer. As a result, more types of jobs will be possible candidates for electronic monitoring. Although the characteristics of monitored jobs listed at the beginning of the chapter (repetitive tasks, high volume of work, low training requirement, high tolerance for turnover, ample labor supply) describe ideal conditions for monitoring, they are not absolutes. It is already possible to apply electronic monitoring to some highly skilled professional and management positions. Sometimes monitoring has not worked well in high-level positions. Employee resistance may have caused management to back down on implementation plans, or, as in the case of bank loan officers interviewed by Westin, employees may have found ways to "game" the system by feeding it false information.[71] The costs and importance of employee resistance can change over time, however. If at some future time management determines that the benefits to be generated from monitoring a particular job category will outweigh possible costs in higher turnover, monitoring systems are likely be introduced. And while professionals may be able to defeat their current monitoring system, a system that automatically collects correct information could be designed if their employer ever decides it is worth the cost.

The growing use of computer-based management information systems also means that more managers will be subject to closer monitoring, simply because more of their day-to-day decisions will be revealed to superiors through the computer system, rather than waiting for monthly or quarterly reports.

If there is a growth in computer monitoring, or a spread to other types of work, it does not necessarily mean a devaluation of office work. Computer-based monitoring can offer advantages to employees, for example, improved feedback and better control of their own work. Professional and managerial workers may be able to use their bargaining power with employers to participate in decisions about the redesign of their jobs or the implementation of work measurement and monitoring, as to assure fair use of monitoring. As with other examples of technology in the workplace, many nontechnological factors, including management and employee attitudes, corporate culture and relative power relationships, will govern how the technology is used.

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[71] Alan Westin, "Privacy and Quality of Life Issues," Alan Westin, "Privacy and Quality of Work Life Issues in Employee Monitoring," contractor report prepared for OTA, 1986.

Chapter 3

Telephone Call Accounting

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distance. Such information, properly examined, can sometimes provide considerable information about the caller.[10]

This chapter reviews the growing trend in use of call-accounting software by employers in and out of government. It also attempts to place call accounting in the context of other telecommunication management tools. Call accounting is only one of a number of technologies gaining use in firms and government agencies to control telephone costs. This chapter also discusses other techniques that can be used instead of or in addition to call accounting.

Managing Telephone Costs

Controlling personal calling is not the only way to reduce the telephone bill. Industry experts estimate that 35 to 40 percent or more of all long-distance calls are "waste calls." These are sometimes characterized as a combination of four factors:

- poor system design,
- fraud (unauthorized use by outsiders),
- abuse (personal use by authorized users), and
- misuse (overuse or the use of a high-cost service when a low-cost alternative is available).[11]

The proportional importance of each category varies from one organization to another, but abuse and misuse are often the largest, according to some experts. Several technological approaches for combatting them are discussed in this chapter.

Poor system design means that telephone equipment and service are not suitable to the particular calling patterns of the firm. In the past 10 years, a bewildering variety of alternatives has developed for business telephone subscribers. Good telecommunications management begins with understanding the needs of the firm and making basic decisions about the size of the system needed, what long-distance carriers to use, whether to lease private lines or to own private switches, and so on. Because of the wide variety of services offered and the different rate structures of the long-distance telephone companies (carriers), wrong design decisions can be costly. Telephone call accounting, as discussed later in this chapter, can be useful in giving a clear picture of telephone use on which to base management decisions.

Telephone fraud perpetrated by outsiders can be costly to an individual firm, but most of its costs fall on the telephone industry and users as a whole. Fraudulent activities range from individual hackers using private systems for their own calls to multilevel marketing schemes that sell illegally obtained authorization codes to consumers. If the legitimate user (individual or corporate) notices charges for these calls on the phone bill and denies making them, the cost is usually absorbed by the long-distance carrier. The cost of telephone fraud was estimated at $500 million in 1985.[12] The telephone industry is attempting to combat fraud by improving system software's ability to detect and investigate illegal users. As will be discussed later in this chapter, telephone call accounting can help firms reduce costs due to fraud by giving them an accurate listing of telephone calls independent of their telephone bill.

There are two basic approaches to reducing unwanted calls. The first is to keep careful track of all calls so that problems of misuse or personal use can be tracked and people who make the calls can be identified. This is called a passive approach to telephone management, and the principal tool is telephone call accounting. The second approach is to design the telephone system so that unwanted calls are difficult or impossible to make, and so that calls that are made are of reasonable length. This active approach to telephone system management is aided by such technological tools as least-cost routing, call blocking, and timed signals.

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[10] For a discussion of the use of pen registers in law enforcement, see U.S. Congress, Office of Technology Assessment, *Federal Government Information Technology: Electronic Surveillance and Civil Liberties*, OTA-CIT-293 (Washington, DC: U.S. Government Printing Office, October 1985).

[11] Interview with Edward Horrell, Mitchell & Horrell, Inc., June 24, 1986.

[12] Walter G. Frier, "Combating Long Distance Service Abuse," *Telephony*, Aug. 11, 1986, pp. 69-70.

As the Federal Government begins the process of revamping its telephone system, it will undoubtedly make use of several of these techniques. The one that has aroused the most controversy is call accounting, because of questions about the privacy of individuals who make the calls. With the advent of improved records on all long-distance calls, the government finds itself faced with the need to review and revise some outdated policies related to the use of its telephone system. Before discussing these policies in detail, however, it would be good to look at how active and passive telephone management tools work and how they are used in government and private industry.

TELEPHONE CALL ACCOUNTING

In the past 3 years, telephone call accounting has become one of the fastest growing segments of the telecommunications market, but call accounting is nothing new. Every consumer engages in telephone call accounting at home by reviewing the monthly telephone bill to make sure that all the long-distance calls listed were actually made by someone in the household.

Telephone bills for businesses, while they are sometimes more complex than residential bills, provide essentially the same information: the date, time, duration, destination, and cost for calls. Usually all this information is provided to business customers as a matter of course for direct-dial or operator-assisted long-distance calls. However, long-distance calls made on Wide-Area Telecommunications Service (WATS) lines (which are billed on an average-cost-per-call basis) and local calls usually are not reported in detail to business customers, unless specially requested and paid for.

Businesses and government agencies are becoming more aware of the value of an accurate record of calls in managing and reducing their telephone costs. Even if call detail is provided by the carrier (long-distance telephone company), the firm may want an independent record of telephone calls in order to verify the carriers' bills or allocate telephone costs to different departments within the organization. Businesses can get such accurate, up-to-date call accounts either from a "service bureau," or through a call-accounting system on their own premises.

It is estimated that about 19,600 stand-alone call-accounting systems were sold in 1985, amounting to revenues of about $206 million for their manufacturers. This market is growing at about 50 percent per year and there are currently about 130 firms that either manufacture a call-accounting device, write call-accounting software, or provide call-accounting services.[13] In addition, many private branch exchanges (PBXs), the computerized switching systems that route telephone calls in many offices, have built in call accounting capability.

How Call Accounting Works

Raw data about calls—the time, duration, called number, originating extension, and estimated cost—can all be collected by a device called a station message detail recorder (SMDR) that can be attached to the telephone system. SMDRs can produce an enormous volume of information that is of little use until it is processed and analyzed.

Probably the oldest type of call accounting is offered by computer service bureaus, which came into existence around 1970. The service bureau uses mainframe computers to process the magnetic tapes produced by SMDRs and provides the customer with monthly or quarterly reports. The cost for such a service varies widely. Depending on the number of lines, the fee can range from $1 to $4 per telephone.[14]

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[13] Daniel I. Strusser, "Good News in the Call Accounting Market," *Teleconnect*, March 1986, p. 62.

[14] Daniel I. Strusser, "The Six Kinds of Call Accounting," *Teleconnect*, March 1986, pp. 66-71.

Figure 9.—Sample Call Detail Report

```
Date:  03/07/84
Time:  11:56:20                                                                              Page: 1

Report Period: 2/24 - 2/29

Name: Dan Jones                                                            Division: Telecommunications
Ext:    1551                                                               Department: Engineering

Date   Time    Duration   Charge   Number called   Facil       (1) City       ST     (2) Acct. Code
2/24   08:01   00:12:15    0.06    616-429-2998    Local     St. Joseph       MI
2/24   11:35   00:25:00    5.86    703-620-0880    WATS      Roanoke          VA
2/25   08:46   00:00:30    0.06    616-429-4151    Local     St Joseph        MI
2/25   08:52   01:12:30   25.90    212-829-4272    DDD       New York         NY
2/25   10:57   00:07:30    0.10                    Incmg
2/25   12:57   00:10:56    4.10    714-525-5252    MCI       Anaheim          CA
2/25   14:00   00:16:01    6.27    312-577-7901    FX        Chicago          IL
2/25   14:07   00:01:30    0.10                    Incmg
2/27   09:43   01:05:03   35.12    714-525-5252    DDD       Anaheim          CA
2/27   12:55   00:01:00     .42    703-620-0880    WATS      Roanoke          VA
2/27   13:14   00:10:00    0.06    616-429-6241    Local     St Joseph        MI
       Totals: 03:42:15   77.15
       Fixed:              5.00    Calls:     11   Cost/Min:  .33
                          82.15
```

There are about 30 firms in the United States that provide this service. Service bureaus have generally been used only by large firms with high volumes of calls and multiple sites.[15]

Advances in computer technology are now making call accounting more economical for smaller firms. Call-accounting software is now available for direct use by the customer, and it can be run on personal computers, minicomputers, and mainframes. About half of the service bureaus, along with dozens of other companies, lease or sell call-accounting software for customers to use. In addition, some PBXs come with built-in capability to record raw call data with a SMDR and to process call-accounting reports. Prices for call-accounting software vary widely, from as low as $800 up to $40,000, depending on the size of the telephone system and on the special features that might be desired.[16] Many software packages produce not only a detailed listing of all calls, but also allow the development of a number of standard and customized reports.

Call Accounting and Telephone System Management

The report-generating capability of the system is important. While the call-accounting device keeps track of all calls in the order they are made, a simple printout of all call records may be of little use, especially in a large firm with thousands of telephones and dozens of locations.

Figure 9 is a sample printout from a call-accounting system. This particular system is designed for small companies—with perhaps 100 to 500 telephones—and runs on a personal computer. Raw call data is transferred to the personal computer from the SMDR through a RS232 connection (like the modular phone jack on most telephones). Once the call records are loaded on the computer, the call-accounting software can produce a number of standard and customized reports. Figure 9 shows all the calls of a particular extension (1551), including the date, time, duration, cost, number called, and city and State of destination number. This information is similar to that found on a telephone bill, except that there is somewhat greater detail. To some extent the level of detail to be used in reports can be chosen by the

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[15] MCI Education Center, *Gaining the Competitive Edge: Network Design*, p. L-6.

[16] Daniel I. Strusser, "The Six Kinds of Call Accounting," *Teleconnect*, March 1986, pp. 66-71.

Figure 10.—Sample Summary of Calls

Date: 03/07/84
Time: 11:43:37

Page: 1

Report Period: 2/24 - 2/29

Ext.	Name	Total cost	Fixed cost	Local cost	L.D. cost	OutDur HR:MN	Incom Cost	InDur HR:MN
101	Jackson, John	16.54	0.35	0.00	16.19	0:25	0.00	0:00
102	Cheever, Chuck	4.48	0.27	0.00	0.75	0:05	0.40	10:32
103	Berg, Wendy	9.36	0.42	5.61	3.33	0:11	0.00	0:00
104	West, Ellen	4.00	4.00	0.00	0.00	0:00	0.00	0:00
111	Cassidy, Mike	16.88	0.56	0.00	13.62	0:18	2.70	5:12
125	Ryan, Pete	3.25	3.25	0.00	0.00	0:00	0.00	0:00
150	Potts, Karl	1.20	1.20	0.00	0.00	0:00	0.00	0:00
155	Jones, Dan	83.05	5.00	0.18	77.67	3:33	0.20	0:09
	Totals:	138.76	15.05	5.79	111.56	4:32	3.30	15.53

system manager. For example, this particular firm has chosen to list and assign a cost to local calls as well as long-distance ones, and to include a listing and charge for incoming (Incmg) calls.

Figure 10 shows a summary report by extension, summarizing the costs and activities of all telephones in a particular department. Similar detailed and summary reports could be generated by extension, by caller, or by account code, for each department or division in the firm.

More sophisticated cost-accounting reports are also useful for equitably allocating telecommunication costs. Based on reports generated by the call-accounting system, costs can be allocated to the proper department, project, or customer account. Law offices, for example, which must keep accurate records of each attorney's expenditure of time and resources for each client, can generate accurate reports of telephone calls related to each case. This might be done either by having staff members dial a cost code before dialing each number, or by having the call-accounting system store telephone numbers known to be frequently used for each client. Call accounting software for hotels and hospitals produces phone changes for inclusion in client bills.

Another advantage of modern call-accounting software is the ability to process mountains of raw call data into useful information about calling patterns and system utilization. For example, a summary of all calls by trunk (or type of service) would enable a telecommunications manager to compare the number of calls and relative expenditures for direct dial and WATS lines to determine if the firm has the right facilities to meet current needs. Or the system could produce a report of the 50 most frequently called numbers, in order of frequency. The telecommunications manager might use this information to determine whether a private line connection would be a more economical way to carry calls between the main office and a frequently called branch office. A report on trunk utilization, by day and hour, can also be useful in analyzing the level of use of the telephone, and might also be useful evidence in case of disputes with carriers about the amount of the telephone bill.

Call Accounting and Employees' Personal Use of Telephones

At some firms and government agencies, analysis of the most frequently called numbers turned up a large number of calls to off-track betting, "Dial-a-Porn," the weather report, and many long-distance calls to locations that did not do business with the organization.

Employees' personal use of employers' telephones has become a concern in the past few years and reference to the money being spent on personal calls is a major sales tool for vendors of call-accounting equipment. Telecommunications trade magazines (and advertisements of cost-accounting system vendors) are full of anecdotes about abuses uncovered when firms first start keeping track of their telephone calls. Stories include, for example, the secretary who placed a one-hour long-distance call during lunch every day in order to listen to a soap opera on her mother's television. Or the man who ran his personal business from the office telephone—a business that required hundreds of long-distance calls weekly. Or the woman who used the call-forwarding feature of her office telephone to receive many hours of long-distance calls at home in the evening.

On the other hand, many other people are using employers' telephones in much less expensive, but still pervasive ways. Employees are human beings with concerns beyond the workplace, and they sometimes have personal business that must be somehow completed during work hours. People with toothaches have to call the dentist. People with car trouble have to call the mechanic to see if the work is done, and then call a neighbor to ask for a ride home. Working parents need to know if their children have arrived home from school; indeed, parents in windowless offices may need to consult the weather report first to know what instructions to give their children.

One survey of Fortune 1000 firms estimated that employees spent an average of 14.9 minutes per day on personal calls (about 3 percent of an 8-hour day), or the equivalent of 1½ work weeks of personal telephone calling per year.[17] The numbers may be suspect, since they are based on estimates by personnel managers, but they show that perception of a problem is widespread. As mentioned earlier, some telecommunications experts have estimated personal calling in the private sector to range from 10 to 50 percent of calls.[18]

Despite the long-term decline in long-distance telephone rates, and the sharp decline since divestiture,[19] telephone costs remain a major expenditure for many firms. Technological tools that promise to further control these costs are attractive to managers, and vendors' assurances of reduced telephone costs have fueled the sales of call-accounting equipment and software.

Personal use of an employer's telephone has been called a "phantom job benefit." Many people consider personal use of the telephone on their desk to be a reasonable perquisite, and the question of when this personal use becomes "abuse" is sometimes difficult to decide. Many people would agree that employees who place several hours of personal long-distance calls per day are outrageously misusing their employer's facilities. Many of the same people would think that an employer that doesn't allow parents to call home each day is insensitive to employees' needs. Reasonable behavior on both sides is somewhere between these extremes, but where should the line of "reasonable use" be drawn? Two local calls per day? Ten? One local call and one short long-distance call?

Often firms recognize a need to balance good management of the firm's resources with the biblical injunction against "binding the mouths of the kine that tread the grain." They are also aware of their own interest—there are other productivity factors to consider in addition to the cost of the telephone call. People's minds are clearer to focus on work if their personal problems are settled. Some calls simply have to be made, one way or another. It may be better for the firm's total productivity to let people take care of personal business during a short break at their desks than to require them to wait in line at the pay phone.

Organizations differ in their official policies of employee use of telephones. OTA interviewed telecommunications managers of several large firms. Some say flatly that office telephones are for business use only. However, the view of one telecommunications manager was common, "We say company phones are for company business, but actually we don't care about local calls as long as they keep it reasonable."[20] A few organizations had no problem with personal long-distance calls as long as they were of reasonable length and the employee reported the call and reimbursed the organization.

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[17] "Employees Spend Over One and A Half Weeks of Job Time on Personal Phone Calls Each Year, Nationwide Survey Reports," Sandford Teller Communications for Accountemps, New York, Aug. 30, 1984.

[18] Judith Havemann, "Toll Calls Abused by U.S. Employees," *Washington Post*, June 21, 1986.

[19] For example see "FCC Orders AT&T, Local Phone Firms to Lower Long-Distance Rate of Return," *Wall Street Journal*, Aug. 8, 1986, p. 3.

And of course, regardless of official policy, there is a wide variation in the enforcement of the policy. Offices that do not keep track of their telephone usage through call accounting have little idea whether the policy is being observed or not.

Even firms using call-accounting systems seldom find it cost-effective to evaluate every call to see if it is official. The common practice is to use the call-accounting system to generate "exception reports," reports that indicate unusual call patterns that might result from misuse. Here is where the ability of the call-accounting system to track all calls by time and originating telephone, and then to correlate and process that information, becomes particularly important. For example, a number of long-distance calls from a department that has no out-of-state business might indicate that personal long-distance calls are being made. Many calls after business hours might indicate that the security or cleaning crews are making use of telephones. The call-accounting system may be programmed to produce a report of calls to certain prefixes, for example, in many cities, all 976 numbers are assigned to "audio text" services like "dial-a-prayer," "dial-a-joke," figure 11 shows a sample exception report of all calls over $5.00 in cost or 30 minutes in duration.

The use of exception reports to find major offenders is effective because most people actually make few personal calls. Despite estimates of the "average" amount of time spent on the telephone, common sense and evidence from a few studies suggest that there is a wide variation in personal behavior. For example, an examination was made of 1,400 unofficial long-distance calls (all to audio-text services) made from the U.S. Department of Education in Washington. The Department has about 5,000 telephones, but two-thirds of these audio-text calls came from just 41 telephones; 45 percent (650 calls) came from just 11 tele-

Figure 11.—Sample Exception Report

```
Date:  03/07/84
Time:  11:48:33                                                                      Page: 1

Report Period: 2/24 - 2/29
Calls     $5.00 or       30 min.

Date     Time      Duration      Charge     Number called    Facility        City          State

              Extension:  226                   User:  Tom Best
2/24     09:44     00:31:30     $ 9.45      714-964-6732      WATS        Anaheim            CA
2/27     13:57     00:36:30        .10                        Incmg

              Extension:  1466                User:  Joseph Carr
2/24     10:46     00:31:45     $17.00      616-983-5555      WATS        St Joseph          MI
2/24     15:19     00:35:30       0.10                        Incmg
2/27     12:37     00:17:32       5.99      212-888-1357      C/O         New York           NY

              Extension:  1533                        User:  Ellen
2/25     09:54     00:22:26     $ 6.12      312-665-7863      WATS        Evanston           IL
2/27     15:33     01:34:12       0.00      616-429-6589      LOCAL       St Joseph          MI
2/29     13:42     00:45:01       4.89      702-734-4444      MCI         Las Vegas          NV
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[20] Interview with telecommunications manager of a financial services organization, December 1985.

phones.[21] Similarly, a 1984 study by the Department of Energy found wide variation in the level of unofficial calling in different offices.[22] Telecommunications managers have found that by relying on "exception reports" to seek out patterns of misuse, they are more likely to find habitual major offenders. This is also considered fairer than closely scrutinizing the telephoning habits of every employee.

Just the existence of a call-accounting system can have a deterrent effect on personal telephone use, even if management makes little use of the reports. When employees are made aware that records are being kept, their personal use of telephones tends to go down. The reverse can also be true when they know there are no records. One firm interviewed by OTA removed its call-accounting capability for several months while making the transition from one telephone system to another. The total number of calls increased dramatically during that period, although it was impossible to tell from which phones the calls were made. Once the new system was running, each employee was sent a memo containing a reminder of company policy and a list of the previous weeks' calls from his or her telephone. Nothing further was necessary to cause the volume of calling to drop to its former levels.[23]

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[21] U.S. Department of Education, Office of the Inspector General, letter report ACN 11-40100, July 25, 1984. The 1,400 calls were made over a 12-month period from November 1982 to October 1983.

[22] U.S. Department of Energy, Office of the Inspector General, "Review of Abuse of Long Distance Telephone Service (FTS) in the Department of Energy," DOE/IG-0217, Mar. 22, 1985.

[23] Interview with telecommunications manager, financial services organization, December 1985.

ACTIVE COST CONTROL METHODS

Active methods of telephone cost control can make use of technology to reduce the cost per telephone call and also to prevent unnecessary calling. Techniques include least-cost routing, calling restrictions or blocking, authorization codes and levels of service, and timed signals.

Least-Cost Routing

Least-cost routing automatically connects a call with the least expensive line available. Many modern PBXs are equipped with this feature, which requires a computer program to "hunt" through the available lines to find one appropriate for the call being placed. For least-cost routing to be most effective, the firm should first study its telecomunication needs to make sure that it has access to the proper assortment of different carriers (AT&T, MCI, and Sprint, for example) and different types of facilities (WATS lines, leased lines, and direct dial) to match its calling pattern.

There are at least 40 different ways to call from New York to Richmond, VA—each with a different price.[24] Deciding which is the cheapest method of calling a given destination at a particular time of day can be a complicated problem, one which would be inconvenient for an employee to solve every time he or she needed to make a long-distance call. The least-cost routing feature makes choosing the right route "transparent" to the user. The employee merely dials; a computer program searches through a table of available lines, times, and rates to pick the least costly route for each call.

At busy times of day, when the cheapest facilities are all busy, several options are available. The system may automatically queue the call, and signal the user when a line is free, or the system may signal the user to try again later. Yet another option is to give the caller a warning tone, indicating that the low-cost lines are all busy. If the call is urgent, the user can hang on, and the call will go through at a higher cost.

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[24] Interview with Edward Horrell, Mitchell & Horrell, Inc., June 24, 1986.

Calling Restrictions

The call-blocking feature allows modern telephone systems to be programmed to restrict the type of calls made by certain telephones or certain callers. For example, the switch may be programmed to block any calls to exchange "976" in order to restrict the use of "audio text" (weather, time, dail-a-joke) calls. Telephones in departments that do not deal with the public can be programmed to make only in-house calls. Telephones of workers with no out-of-town business can be programmed to provide only local service. Certain telephones can be authorized to make long-distance calls only via the lowest cost service, where others may be able to override the least-cost routing feature and make a long-distance call even when low-cost lines are busy.

Authorization Codes and Levels of Service

Telephone systems can also be programmed so that no telephone will put through long-distance calls unless preceded by an authorization code that should be known only to people authorized to make calls. The code also allows the system to charge the call to a particular person or account, which is useful for cost allocation purposes.

Authorization codes can form the basis for different levels of service. Workers with a need to make international calls can be assigned an authorization code that permits such calls. Those who only need to make calls within one State can be given a code that allows this more restricted level of calling. Similarly, the telephone system can be programmed to allow some classes of users to make calls by the lowest cost service only, while other users may have an "executive override" status that allows calls on higher cost lines if low-cost lines are busy. The State of New York, for example, has 26 different levels of service to accommodate needs of different classes of users.[25]

The advantage of authorization codes is that they are independent of the individual telephone instrument. A person who is authorized to make long-distance calls may do so from any telephone in the system. The code is still valid if the user moves to another office. On the other hand, an unauthorized person cannot make calls on any phone, unless he or she discovers a code. In addition, authorization codes can be easily changed. For example, if the user's job changes to require a different level of service, or if it is discovered that an unauthorized person is using a code, the old authorization code can be canceled and a new one issued in short order.

A disadvantage of authorization codes is that they require the user to dial five to seven additional digits at the beginning of each long-distance call. This is annoying to most users and a real hardship for those who need to make many calls in a day. The State of New York has overcome this problem by making use of the speed dialing feature of modern telephone systems. Speed dialing allows the user to store a list of frequently called long-distance numbers (in some systems up to 60 numbers per user) in the telephone's memory. Each number is then referred to by a two-digit code. When calling any of these numbers the user must still dial the authorization code in full, but only dials the two-digit code to reach the frequently called number. Thus the total number of digits dialed per call is reduced to a manageable number.

Because authorization codes are generally used to allocate costs, they are usually used in conjunction with a call-accounting program.

Timed Signals

Several firms and government organizations use timed signals to remind callers of the time they are spending on telephone calls. Telephone systems can be programmed, for example, to give users a tone after some predetermined period—say 4 or 5 minutes. While no penalty accrues to the user who continues to talk beyond this point, the feedback is often useful in reducing the average length of calls.[26] People sometimes have no idea how long they have been talking, and a 5-minute warning reminds them that long-distance calling does cost money.

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[25] Interview with Peter Arment, State of New York, Division of Telecommunications, September 1986. The 26 levels of service include both voice and data transmissions.

[26] Ibid.

STUDIES OF UNOFFICIAL USE OF GOVERNMENT TELEPHONES

Personal use of Federal Government telephones is not only contrary to "company policy"—it is illegal. The Federal Information Resources Management Regulation (41 CFR 201-38.007) specifically forbids the use of FTS or other government-provided long-distance service for personal reasons, and provides for fines, suspension, or dismissal of offending employees. Furthermore, 5 CFR 735.205 prohibits the use of government property generally for personal reasons. Some employees and contractors have also been indicted under Title 18, Section 641 (Public Money, Property, or Records), which provides criminal penalties for the theft of "a thing of value" from the government. For example, 4 employees and 25 contract employees of the Department of Energy were indicted for personal telephone use in 1981. Under a pretrial diversion, the defendants repaid the government $38,487.[27]

Despite the illegality, government employees use their employer's telephone for personal reasons just as much as private sector employees do; some would say more so. A number of studies conducted by individual departments in the past few years have found that an estimated 30 to 60 percent of long-distance calls are of an unofficial nature. A more recent study, part of a coordinated multi-agency audit, reported personal calls made up an average of 33 percent of off-network calls sampled in the Federal Telecommunications System (see below for a description of FTS off-network calls). About 20 percent of calls sampled on the government's commercial lines were personal.[28]

Some agencies' studies have also tried to estimate the loss to the government in terms of wages paid for time spent in personal calling. The Department of Energy, in its study of phone use, added to the $8 million per year cost of personal calls, an additional $6 million per year for lost wages. This was calculated by multiplying the total minutes of calls during work hours (8 a.m. to 12 noon and 1 p.m. to 5:30 p.m.) by the average wage rate for the department.[29] The figure is probably inflated as the calculation does not consider that employees could have made calls during their breaks or other slack periods when they had no other work. However, in the case of major offenders, for example a person running a private business from a government phone, wages lost to the government could be significant. In the Richland, Washington case mentioned above, the 29 defendants were required to repay lost wages along with other fines and the cost of the calls themselves.

The Federal Government is a major user of telephone services. Its Federal Telecommunications System (FTS), established in 1963, provides voice and low-speed data telecommunication services throughout the United States, the U.S. Virgin Islands, and Puerto Rico. The system contains about 1.3 million telephones, 1,600 local switchboards, 52 major switching centers, and 15,000 long-distance trunks. About 88 percent of the long-distance FTS service is through leased AT&T facilities, with the rest provided by GTE/Sprint, MCI, and other carriers.

The General Services Administration (GSA) manages FTS and supplies telephone service to most Federal agencies as required by the Federal Property and Administrative Services Act of 1949 (40 U.S.C. 481). Some of these are "full service agencies," in that they receive all their telephone service through GSA. Others, including Departments of Energy, Justice, Commerce, and the Veterans Administration, procure their own local telephone service in the Washington area, and rely on GSA only for long-distance services. These are known as "exclusive use agencies."

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[27] U.S. Department of Energy, Office of the Inspector General, "Review of Abuse of Long Distance Telephone Service (FTS) in the Department of Energy," DOE/IG-0217, Mar. 22, 1985.

[28] Judith Havemann, "Listen Up Government Workers: You May Be Allowed One Phone Call," *Washington Post*, Sept. 11, 1986. See also President's Council on Integrity and Efficiency, "Consolidated Report on Federal Telecommunications System (FTS) Utilization," prepared by the General Services Administration, Office of the Inspector General, Mar. 16, 1987.

[29] U.S. Department of Energy, Office of the Inspector General, "Review of Abuse of Long Distance Telephone Service (FTS) in the Department of Energy," DOE/IG-0217, Mar. 22, 1985.

There are three types of "long-distance" calls:

- A *commercial call* is made by dialing 9 from a government phone and accessing the local telephone system; intercity calls made after dialing 9 are billed at the regular commercial toll rate.
- *FTS on-net calls* are intercity calls between two government telephones.
- In *FTS off-net calls*, the originating telephone is part of FTS but the receiving telephone is not. In such a case, the call would travel as far as possible on FTS, and then would go off-network and use commercial lines to reach its destination.

Off-net calls are generally more expensive than FTS calls; commercial calls are most expensive. On many government telephones, a feature called Automatic Route Selection (ARS) automatically transfers commerical calls to the lower cost FTS network whenever possible. This is similar to the "least cost routing" feature discussed earlier.

FTS handled about 300 million calls in 1986 and cost the government about $500 million. Off-network calls represent about 65 percent of the calls and 69 percent of the cost. In addition, commercial toll calls cost about $15 million in 1986.

For FTS calls, GSA pays the long-distance carriers, bills the participating agencies quarterly, in advance, and then adjusts for actual usage. Usage figures for long-distance calls are currently collected by the telephone industry, using the Automated Message Accounting (AMA) systems of local telephone companies and long-distance carriers. The detailed call record includes the telephone number of the originating user, a billing account code, the date and time of the call, the telephone number of the called party, and the duration in minutes. Currently, call detail information is collected on only a 20-percent sample of FTS calls one call in five. GSA uses the information in this sample to calculate quarterly telephone bills for each department, and also sends copies of the call records to agency telecommunications managers. Due to the large backlog of work in calculating telephone bills for all the agencies, AMA reports have been sent to the agencies 3 to 6 months after they are collected.[30]

Local calls are billed to each agency monthly through GSA's Telephone Inventory Accounting System (TIAS). Commercial toll calls are billed to agencies directly by the long-distance telephone companies.

The PCIE Review of FTS Utilization

The previously quoted figures on personal use of FTS came from an audit recently conducted by GSA at the direction of the President's Council on Integrity and Efficiency (PCIE). It is the most recent attempt by the Federal Government to study telephone use on a governmentwide scale. The study involved a statistical study of telephone use at 16 agencies (basically an analysis of exception reports). In addition, GSA conducted a call-back audit of a sample of telephone calls from 14 agencies.[31]

For purposes of the auditing project, GSA provided a sample of call detail listings of off-network and commercial long-distance calls to the Inspector General of each participating agency. These call records came from the regular 20 percent sample of FTS calls and from telephone company billings for commerical calls. Personnel from the Inspector General's office called back the numbers listed on those records to determine whether anyone at the destination telephone engages or has engaged in business with the department or agency making the call. Calls were then classified as "official," "unofficial," or "unresolved."

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[30] U.S. Department of Education, Office of the Inspector General, letter Report No. 11-40100, July 25, 1984.

[31] President's Council on Integrity and Efficiency, "Consolidated Report on Federal Telecommunications Systems (FTS) Utilization," prepared by the General Services Administration, Office of the Inspector General, Mar. 16, 1987.

If the potential use of call accounting in government raises questions of privacy, fairness, and enforcement, a call-back audit, like the one conducted by PCIE, was even more controversial. Announcement of plans for the audit (in late February 1985) was greeted with immediate statements of concern by civil libertarians, union leaders, and others.

One concern was the potential for "selective disciplinary action against workers considered undesirable by agency managers."[32] When the PCIE study was announced, fear was expressed that, if the personal use of telephones was as widespread as GSA believed, then nearly every employee was to some degree guilty. This being the case, telephone audits could be used as a potential weapon against whistleblowers or other dissidents. One article noted that in 1982 "investigators in the Environmental Protection Agency secretly examined the agency's long distance phone records to determine whether Hugh Kaufman, a government employee who had disclosed information that led to the removal of most of the agency's top officials, had talked with news organizations."[33]

Union leaders also expressed the fear that information from the audit could be used to harass union members.[34] Nor were critical comments limited to labor groups. Bun Bray, president of the Federal Managers Association, called the audit "another little deal to punish Federal employees," and asserted that the savings from the program would prove "insignificant and minimal." "If they really want to save money, they ought to take those resources and check out General Dynamics and some of those other defense contractors that are ripping off the taxpayer," Bray said.[35]

These topics along with other civil liberties questions, also attracted congressional attention. For example, Representatives Don Edwards (Chair, House Subcommittee on Civil and Constitutional Rights) and Patricia Schroeder (Chair, Subcommittee on Service) wrote to the Office of Management and Budget (OMB) requesting further information on the audit:

> 1. What is the source of authority for the proposed monitoring scheme?
> 2. How would the monitoring program be conducted, who would conduct it, and what types of telephone calls would be examined?
> 3. How long would the program last?
> 4. What types of data or analyses would the program yield?
> 5. How would the resulting data and analysis be used and who would have access to them?
> 6. What measures would be taken to limit dissemination of the data and analyses?
> 7. What guarantee is there that the program will not be used to discourage whistleblowers, to stifle dissent, to limit news media access to information, or for other political purposes?
> 8. What would happen to the data and analyses after the initial analysis is completed?
>
> Our Subcommittees would like to be assured on these points, and any others that may be raised as additional information comes to light, before any monitoring begins.[36]

In his reply, Joseph R. Wright, Jr., Deputy Director of OMB, said the purposes of the PCIE review were "to reveal patterns of misuse of the Federal long distance telephone systems" and to develop "recommendations for systemic improvements in the management of these systems."

Wright also gave specific answers to questions raised by the congressional letter. For example, with regard to limiting dissemination of the audit data he said:

> . . . [it] will be limited to the staff of participating Inspectors General. The bulk of the data will be placed in audit workpapers and used to support audit findings which are sum-

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[32] Bill Montague, "Planned Phone Audit Brings Blast From Several Groups," *Federal Times*, Mar. 25, 1985.

[33] David Burnham, "U.S. Phones Raise Issue of Privacy: New Equipment Would Provide Detailed Records of Calls," *New York Times*, Mar. 17, 1985.

[34] Bill Montague, "Planned Phone Audit Brings Blast From Several Groups," *Federal Times*, Mar. 25, 1985.

[35] Ibid.

[36] Mar. 13, 1986 letter from The Honorable Don Edwards and The Honorable Patricia Schroeder to Joseph R. Wright, Jr., Deputy Director, Office of Management and Budget.

mary in nature. Any data which require initiation of an investigation will be treated as evidence and will be accordingly protected. Data which may bring together names and numbers will be filed as part of the IGs' Privacy Act systems of records.

On the question of whistleblowers or the stifling of dissent, Wright reassured the committees that:

> . . . long distance calls to news media, congressional offices, public interest groups, etc., will be considered business calls for the purpose of this review. . . .
>
> The review is being performed by statutory Inspectors General who have, among other duties, responsibility under their own enabling legislation to protect whistleblowers. In addition, the Civil Service Reform Act clearly prohibits the kinds of activities described in your question . . . while there are no absolute guarantees that all persons will act properly, there are ample procedures to deal with those who are found to have committed such prohibited personnel practices. . . .

Representatives Edwards and Schroeder replied to Wright, indicating their appreciation that the PCIE "is sensitive to preventing unwarranted disclosures of information collected in any audit and avoiding invasions of privacy." Drawing on concepts in Wright's letter, and their own sense of proper elements to go into guidelines for the audit, the two Members of Congress suggested a number of principles to be included in those guidelines.

A detailed memorandum of "Guidance on the Privacy Act Implication of the PCIE Review of Federal Telecommunications Systems (FTS) Utilization" was completed in August 1985. This document included many of the principles outlined in the Edwards-Schroeder letter, as well as safeguards discussed by Wright. These guidelines were adopted as the PCIE audit progressed through 1985 and 1986.

Results of PCIE Audit

The PCIE audit, conducted by the Inspector General's office of each participating agency, made use of a sample of call detail records supplied by GSA. They included both "off-network" FTS calls and commercial telephone calls. Researchers called each destination number in the sample to determine whether anyone at that location engaged in business with the department or agency making the call. At the conclusion of a conversation with the person or persons at the destination, calls were then classified "official," "unofficial," or "unresolved."

Table 9 shows results of the FTS off-network sample. The weighted average (based on the

Table 9.—Results of FTS Intercity Off-Network Call Sample by Agency

Agency	Estimated calls (%)	Unofficial minutes (%)	Traffic cost (%)
1. Department of Agriculture	30.5	26.5	23.6
2. Department of Commerce	25.5	40.0	37.9
3. Department of the Interior	29.5	40.4	35.6
4. Federal Bureau of Investigations	26.5	30.0	25.1
5. Department of Labor	45.5	45.1	44.8
6. Department of Treasury	42.0	45.3	41.1
7. Office of Personnel Management	36.5	41.1	38.9
8. General Services Administration	39.0	49.7	47.5
9. Environmental Protection Agency	29.0	23.3	22.2
10. Small Business Administration	27.5	39.8	34.9
11. Department of Health and Human Services	35.0	28.7	25.7
12. National Aeronautics and Space Administration	41.0	48.3	43.2
13. Department of Housing and Urban Development	27.0	36.5	33.2
14. Department of Education	28.5	41.0	36.8
Simple average	33.6	36.4	33.3
Weighted average	33.6	36.4	33.3

SOURCE: President's Council on Integrity and Efficiency, "Consolidated Report on Federal Telecommunications System (FTS) Utilization," prepared by the General Services Administration, Mar. 16, 1987.

Table 10.—Results of Commercial Long-Distance Call Sample by Agency

Agency[a]	Estimated calls (%)	Unofficial minutes (%)	Traffic cost (%)
1. Department of Agriculture	10	3.3	2.3
2. Department of Commerce	26	31.1	25.5
3. Department of the Interior	6	1.0	.6
4. Department of Labor	40	49.3	40.2
5. Department of Treasury	14	11.3	8.3
6. Office of Personnel Management	34	17.2	15.3
7. General Services Administration	26	14.4	3.6
8. Environmental Protection Agency	18	6.2	2.6
9. Small Business Administration	46	40.6	42.5
10. Department of Health and Human Services	22	15.8	15.1
11. National Aeronautics and Space Administration	14	18.5	12.4
12. Department of Housing and Urban Development	36	36.8	35.8
13. Department of Education	44	28.6	25.3
Simple average	25.8	21.8	14.6
Weighted average	19.9	15.8	11.0

[a] Federal Bureau of Investigation did not participate in the audit of commercial telephone calls.

SOURCE: President's Council on Integrity and Efficiency, "Consolidated Report on Federal Telecommunications System (FTS) Utilization," prepared by the General Services Administration, Mar. 16, 1987.

size of agencies) of the number of unofficial calls found was 33.6 percent. These calls made up 36.4 percent of the total telephone time sampled, and 33.3 percent of the total cost of the calls sampled.

Table 10 shows that use of commercial lines was quite different. The number of calls was smaller, with a weighted average of 19.9 percent of the sample being classified as unofficial. In addition, these calls made up only 15.8 percent of the total time of commercial calls sampled and only 11.0 percent of the cost. This would suggest that many of the personal commercial calls were short duration or low-cost calls.

An estimate of the cost of personal calling to the government could be developed by comparing the cost of the personal calls in the sample to the relevant portion of the government telephone. For example, 33.6 percent of the $345 million spent for FTS off-network calls is $116 million, 11.0 percent of the $15 million spent on commercial calls is $1.6 million. Thus, simple extrapolation from the audit would suggest that personal calling cost the government around $118 million in 1985.

While this extrapolation gives a rough estimate, there are a number of reasons why it may offer a distorted picture of personal telephone use in the government. For example, calling patterns in Washington may be quite different than those in other areas of the country, so that personal use statistics found in the audit should not be applied to the entire Federal telephone bill. Locations outside the Washington area were not included in the PCIE audit. However, two agencies, the Departments of Defense and Energy, sampled some areas outside Washington at the same time as the PCIE audit. These agencies found unofficial use ranging from 40 to 50 percent, suggesting that personal use in Washington may be the same or a little lower than elsewhere in the country. However, the results are not strictly comparable because the sampling technique and study methodology were different.

FUTURE DIRECTIONS FOR GOVERNMENT TELEPHONE MANAGEMENT

Need for New Policies

Most of the questions raised by the audit still remain open. The exchange of letters between Congress and the Office of Management and Budget resulted in modified guidelines for the PCIE audit conducted in 1985-86. In addition, OMB issued guidelines related to handling of call detail records under the Privacy Act. However, the question of the basis for future permanent guidelines on the management of the government's telephone must still be resolved.

The government has been collecting call detail information for long-distance calls for a long time. The recent audit relied on no new technology. A similar audit could have been conducted at anytime in the past 10 years. As mentioned above, GSA provides its 20 percent sample record to all government agencies, although the agencies do not always use this detailed call information on a regular basis. The government has used this information when there is sufficient need or motivation. For example, examination of long-distance telephone records was an important element in the investigation of Department of Commerce employees suspected of using "inside information" in stock trading deals. A number of employees were required to reimburse the government for long-distance calls as a result of that investigation.[37]

The opportunity to create a usable government policy on telephone use is especially important in the light of the development of a new long-distance system to replace FTS, and in the light of plans of a number of agencies to take control of their own telephone management. Several, like the Departments of Transportation and State, have already begun procuring their own local service for their headquarters offices. In most cases, these agencies have also purchased or leased new telephone equipment, including switching equipment with call accounting, call blocking, and other modern features. Developing and implementing a governmentwide policy may become increasingly difficult as the system becomes more fragmented. GSA, as the governmentwide telecommunications manager, is currently trying to revise policies related to long-distance telephone use.

A number of major questions need to be decided on a long-term basis. How will personal use be defined, and what level of personal use will be tolerated? Will there be a continuing role for audits, such as the one recently completed? Will local calls be included in future audits? What will be the policy toward long-distance calls to suburban areas? What can be done to ensure employees proper access to the press, to union representatives? Can a sufficient level of protection be given to call-accounting records to prevent their misuse? What role, if any, will service observation or other types of "listening in" play in government telephone management? What alternative kinds of management techniques are appropriate for use on government telephones? These questions are addressed in the following sections.

Establishing a Policy on Personal Use

GSA has been struggling to develop a successor to the current policy of "no personal calls." A number of alternatives might be considered. This section will discuss only long-distance calls, which are the main focus of concern. Local calls will be considered later.

One approach would be to allow personal long-distance calls at the government's expense under certain circumstances, for example in case of accident or illness, to check on babysitters, or transportation arrangements. The problem here is to create a list that eliminates frivolous calling, but still covers all reasonable circumstances, including some as yet unforeseen.

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[37] John M. Berry, "Three Commerce Employees Fired for Profiting From Data," *Washington Post*, June 13, 1986, p. 1.

Another approach would be to allow workers to make private long-distance calls on FTS on a cost-reimbursement basis, as is the policy in some private firms, universities, and State agencies. The problem with this approach is the possible bookkeeping burden that could be created for an organization as large as the Federal Government. It would be necessary to establish a method for identifying personal calls, billing employees, and collecting money. Organizations that allow reimbursement tend to be small offices with a collegial atmosphere; identification of personal calls is basically an "honor system," reinforced by supervisory review of monthly call records. Usually, a printout of calls is circulated among the staff each month so that each person can initial his or her personal calls. While this approach makes it possible for employees to use the telephone freely, and provides reimbursement to the employer, it does not protect privacy. Not only supervisors, but everyone in the office typically sees the printout and could, if they were interested, make note of who called whom.

Using a call-accounting system, it would be possible to develop a private printout or "telephone bill" for each worker's telephone. However, identifying personal calls might still be a problem. Workers would be "on their honor" to claim personal calls; those with a poor memory or an underdeveloped sense of honor would still make calls at the government's expense, unless some sort of regular audit were made.

Collecting payment for calls would require the creation of an administrative structure and would generate costs that would have to be passed on to the users, thus raising the cost of the calls. Presumably this would be little different from other instances (bookstores, cafeterias) where government employees pay cash for a service; however, in most cases these are usually provided by contractors rather than directly by the government. It is not likely, in any case, that agencies will want to go into the "telephone business" on a regular basis for their employees.

Another approach would be to allow government workers to make personal long-distance calls from the telephones on their desks as long as the calls are bill to a home number or personal calling card. This approach is quite feasible now, given the near universality of calling cards. However, it may be considered illegal, since current regulations prohibit the personal use of the government's telephone as well as FTS. Billing calls to a home number is technically possible from many government phones and could be made possible from the others. The costs to government of such a policy would be primarily in terms of employee time (for calls not made during lunch period or break).

Because many personal calls may be calls home made by Federal workers traveling out of town, GSA has advanced a proposal to allow each Federal worker one call home per day of travel. This practice is held to be typical of personnel policies in private businesses. GSA has estimated that the cost of such a policy could be as high as $100 million per year, based on the total travel days of Federal workers. It is not possible to tell how many personal calls are currently made by traveling workers, thus it is not known how much moving this particular type of call from the "prohibited" to the "permitted" category would affect the level of personal use of the system.

Exception Reports and Personal Use

Telecommunications managers in many private and State government telephone systems have found that the use of "exception reports" is the most effective way to discover patterns of personal use. The computer software is used to select and report on calls that have a high likelihood of being unofficial, for example, calls to audio text numbers, calls at unusual times or to unusual destination areas, long or reoccurring calls. The ability to use computer software to identify only larger instances of possible personal use would also seem the most cost-effective approach. Call-back audits, if it is decided they are appropriate, could then be conducted in those specific cases where a pattern of prohibited personal use was suspected, rather than as a general approach to telephone management.

Use of exception reports requires decisions about the thresholds below which possible personal use can be tolerated or at least disregarded. This is generally not a problem in the private sector, where it is a management decision, tempered perhaps by the "corporate culture." But in the Federal Government, there is at least the philosophical difficulty caused by the fact that *any* personal use is not only contrary to policy, but illegal. Even if some tacit threshold of "reasonable personal use" were implemented, questions of equity might still be raised. People who were caught exceeding the threshold could claim they are being treated unfairly because "everyone else" is also guilty to some lesser degree.

Many agencies are not currently equipped to manage their telephone systems using exception reports. While some agencies may be making regular use of the call detail records provided by GSA, others are not. One Department of Education study noted that the printout exceeds 1,000 pages per month; there is insufficient staff to study the printout on a regular basis; in some cases the reports have remained in unopened boxes for months.[38] Similar complaints have been voiced by Department of Energy and the General Accounting Office. A simple listing of detailed call records is generally of little help as a telephone management tool. The information requires further computer sorting—by extension, frequently called numbers, long calls, etc., in order to be of much use. Several agencies are making use of call detail information from GSA, from their own telephone systems, or directly from telephone companies to develop their own exception reports.

GSA is currently planning to make call detail information from its 20-percent sample more useful to agencies by providing exception reports to agencies using FTS service. GSA is also investigating ways to make call detail data available to some agencies in machine-readable form so they can more easily use their own computers to sort the information and develop management reports.

Of greater importance for the government will be establishment of clear guidelines for the handling of exception reports and other computer-based call records to protect the privacy of employees and to prevent any possible misuse of these records by supervisors or others within the government.

Future Use of Call-Back Audits

One major question in the future of the government's continuing telephone management is how or whether call-back audits will be used on an ongoing basis. One major purpose of the recent PCIE pilot study was to provide a benchmark of current telephone system usage. The primary reason, however, was to develop methods for detecting personal use in the future. There will likely be strong arguments to make call-back auditing a regular feature in Federal telephone management.

The PCIE pilot study was coordinated by GSA, but the actual audit was done by the Inspector General of each participating agency. Each of these agencies is issued its own report and is developing its own action steps to improve management of its telephone system. While GSA is the governmentwide manager of FTS, agencies have considerable discretion in correcting their own problems.

It is possible that within a few years, PCIE will want to conduct another multi-agency study in order to compare the results to the recently completed study. Even if this is not done, a number of individual agencies may decide to undertake studies on their own, using the techniques developed in the PCIE pilot study.

Even more likely is that agencies will want to use a modified version of the call-back audit on a regular basis to complement their exception reports. Agencies that create exception reports to identify patterns of "suspicious" calls (e.g., unusually high number of calls, unusually long calls, calls to unusual area codes) could use the call-back method to determine whether or not they are legitimate.

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[38] U.S. Department of Education, Office of the Inspector General, letter report ACN 11-40100, July 25, 1986.

This use of the method still raises some questions concerning the privacy of telephone users. However, it has the advantage of affecting a smaller population—only those whose calls are "suspicious," rather than the entire work force. This approach has some appeal, since it targets investigation at specific cases of suspected misuse rather than placing the entire work force under suspicion. As mentioned in an earlier section, it would be necessary for the agencies or for GSA to establish guidelines for determining when a calling pattern warrants investigation.

Local and Suburban Calls

An additional question arises about the ongoing policy with regard to local calls. The recent PCIE audit did not cover local calls, and GSA does not collect detailed information on local calls on a regular basis and has no plans to do so (such information could be obtained from local telephone companies if especially requested and paid for). In their second letter to OMB, Reps. Edwards and Schroeder expressed the opinion that the government "should not procure or install any service, feature, equipment or system that would permit it to obtain call-accounting data on individual local calls." New equipment being purchased by some departments will have the capability to record detailed information on local as well as long-distance calls. In some agencies, it is programmed only to report time and duration of local calls, not the destination telephone number. At the present time there is no governmentwide policy on this topic, and individual departments have to choose how to make use of this feature of the equipment. A governmentwide policy on this topic would be useful.

Local calls generally make up a much smaller proportion of telephone costs than long-distance calls, but they are not completely cost free. Besides the "message unit" charge by the local telephone companies (7.5 cents per call in Washington), there is the cost for additional telephone lines if the volume of personal calls gets too high. In addition, there is the question of employee time.

The private sector telecommunications managers interviewed by OTA, however, expressed no interest in accounting for local calls. They saw excessive local phone use as a management problem, but not a *telephone* management problem. One said, "That's up to the managers and supervisors. If their people are on the phone all day, incoming calls can't come in, so they tell them to keep it short."[39]

Calls to nearby suburbs will require separate consideration. These calls may be functionally the same as local ones, but are long-distance calls due to the arbitrary boundaries of local service areas. In the Washington area, for example, employees who telephone from downtown Washington to their homes in Bethesda, MD, are making a local call, but those who call home to Herndon, VA, are making a commercial toll call. A large number of the personal commercial calls discovered by the PCIE audit probably fit into this category. This would account for the relatively short duration and low cost of calls shown in table 10—many of them were brief personal business calls of the "checking on the babysitter" variety. The government might decide to allow these employees one call or a reasonable number of calls per day, as discussed above. On the other hand, the government might take the position that the cost of calling the suburbs, like the cost of daily transportation to the suburbs, is the employee's responsibility, and might provide resonable means (pay phones or the use of calling cards) for employees to make these calls at their own expense.

Calls to Press, Union, or Public Interest Groups

The policy of the PCIE pilot study was to treat any call to a press organization, public interest group, congressional office, or labor union as "official business" without further examination. However, as Reps. Schroeder and Edwards point out,

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[39] Interview, May 1986, with the telecommunications manager of an insurance firm.

> . . . deeming such calls "official" does not address . . . the fact that the Government will be able to determine who has called whom. The availability of such information and the ready means to analyze it remain in our minds the most troubling—and as yet unresolved—aspects of the PCIE proposal.

The question of how these calls will be treated on an ongoing basis remains open, and gives rise to the further question of who will have access to call-accounting records.

There seems to be little doubt that the information in telephone call detail records could be used to identify and possibly harass whistleblowers, people who speak with the press, union organizers, and dissidents. While harassment of such people is a violation of the Civil Service Reform Act, use of time and attendance records, for example, to harass whistleblowers does take place.[40] New technology call-accounting software makes it much easier than in the past to isolate the calls made from particular telephones.

If call accounting and use of audits must be used to protect the government investment in its telephone system, it may also be necessary to take positive action to protect the civil liberties of telephone users. This protection might take the form of clear and enforceable regulations to protect the privacy of call-accounting records. This kind of transactional data about telephone calls, while probably not as personal as the content of the calls themselves, does warrant protection.[41] Regulations may be needed to ensure that information remains under control of telephone system managers, and perhaps inspector generals, who need it to manage the telephone system, and that data is not available to supervisors or other managers who deal directly with employees.

In the absence of clear policies and procedures regarding who has access to this information and what they do with it, the possibility for misuse of the information is great. The challenge is to develop procedures that will protect the privacy and first amendment rights of Federal employees, without unduly hampering investigation into cases of wrongdoing.

Eavesdropping and Service Observation

The PCIE study did not in any way involve the content of telephone calls. "Service observation"—listening in to employees' dealings with the public—is practiced in Federal Government offices such as the Veterans Administration, Internal Revenue Service, Social Security, and other agencies with customer service responsibilities. Federal Information Resources Management regulations require Federal agencies to notify both employees and the public that service observation may take place, although there is no requirement to signal that an observer is on the line.

Eavesdropping on other types of calls as a strategy to reduce personal use of telephones is of questionable value and legality. The instances where Federal managers have been found recording or eavesdropping on conversations for any purpose have caused public indignation. One recent incident prompted the introduction of legislation to specifically prohibit listening in on or recording conversations on the Federal telephone system, except in specified instances such as service observation programs (H.R. 502, 99th Cong., Federal Telecommunications Privacy Act of 1985).

Further, as is discussed in chapter 4, in at least one case in the private sector, a court has ruled that an employer's listening in on an employee's private telephone conversation is eavesdropping and a violation of Title III of the Omnibus Crime Control and Safe Streets Act (18 U.S.C. Sec. 2510), even though the employee was using a telephone normally included in a service observation program.

Aside from the privacy and legal questions, eavesdropping would also be a costly and impractical means of managing a telephone system. It would probably be unfair, as well, since only a few workers' calls would be affected.

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[40] Myron Peretz Glazer andd Penina Migdal Glazer, "Whistleblowing," *Psychology Today*, August 1986; Donald E. Soeken, "J'accuse," *Psychology Today*, August 1986. Also, interviews with Donald E. Soeken, February 1986.

[41] U.S. Congress, Office of Technology Assessment, *Federal Government Information Technology: Electronic Surveillance and Civil Liberties*, OTA-CIT-293, (Washington, DC: U.S. Government Printing Office, December 1985).

Other Methods of Cost Control

Finally, given that government agencies will be procuring new telephone equipment and services over the next few years, it would be prudent to consider the use of other methods of telephone cost control that may supplement, or even replace, call accounting as a means of controlling the costs of personal calls. It should be possible, given the right technological and administrative tools, to greatly reduce the number of unwanted or unauthorized calls.

One approach is education. Many employees actually believe that calls on FTS (or an employer's WATS lines in the private sector) are free. The belief has developed over years in which no accounting was made, where widespread personal use was tacitly tolerated, and where employers and agencies *themselves* have treated telephone service as a free good. The PCIE audit has been a first step in demonstrating that the government's policy is changing.

A first step in changing the calling habits of government workers might be a nonpunitive educational campaign to inform employees of the new policy on personal calls once that policy is developed. This campaign should include information on the methods of call accounting that are being used. As mentioned earlier, the mere knowledge that an effective recordkeeping system is in place has a dampening effect on personal calling. Educational efforts should also fully inform government workers of the kinds of calls that *are* permitted, and inform them of alternative means of making necessary calls not permitted on the government telephone system.

Education programs with respect to telephone use can be effective. Agencies have found that they reduced their employee's level of misuse (use of an expensive facility when a cheaper one is available) through educational programs aimed at increasing use of FTS and reducing use of commercial lines.[42]

The other strategy is to make use of active cost control measures discussed earlier in this chapter, for example "blocking" and "level of service access" features. Designing a telephone system that is best suited for doing the government's business might be preferable to scrutinizing call records to catch government workers who misuse a poorly designed system. As mentioned earlier, modern telephone systems do allow for the programming of different levels of service, depending on the telephone needs of the end user.

The government currently has some capability in this regard, but it is not used to a great extent. There are five levels of FTS telephone service available; these affect only the end user's ability to make outgoing calls, not the ability to receive incoming ones. The levels are:

1. *Standard Service:* Can call only government telephone in local area.
2. *Commercial Service:* Can call government local telephones and commercial lines (dial 9). This includes the ability to access commercial long-distance lines after dialing 9.
3. *Government Service:* Can call local and intercity government telephones, but no commercial lines.
4. *National Service:* Full access to both government and commercial telephone networks, but no international dialing.
5. *International Service:* Full access to Government and commercial networks and international dialing.

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[42] See for example, U.S. Department of Education, Office of the Inspector General, "Report on Review of Telephone Changes," Sept. 11, 1981.

According to GSA, the distribution of these levels of service among government full-service agencies was as follows:

Level of service	*Main lines*	
1. Standard	881	(0.6%)
2. Commercial service	532	(0.4%)
3. Government service	242	(0.2%)
4. National service	36,267	(25.6%)
5. International service	82,955	(58.7%)
No level	20,443	(14.5%)
Total	141,320	(100.0%)

The "no level" category refers to lines that could not be classified or were installed before the classification went into effect.[43]

As shown above, 84 percent of the lines are in the two highest levels of service. While it is possible that such a large number of Federal workers need access to the full range of national or international telephone service, it is likely that the actual number with a business need to make extensive long-distance calling is lower than 84 percent. In the past, the relative difficulty of changing the level of service on a given line once it was installed made it difficult to assign specific levels of service to specific types of users. To ensure that telephone service would be at least adequate to the needs of any group of workers stationed in a particular office, lines have usually been assigned a fairly high level of service.

However, new digital telephone systems will have greater flexibility and could allow more extensive use of programmed levels of service that can be changed as needed. Meaningful levels of service that reflect the calling patterns of government workers would have to be developed, and individual agencies would need to determine which of their employees need access to commercial lines, which to FTS lines, which to off-network destinations via FTS lines, and so on.

Restrictions might also be assigned to the telephones themselves, or to their users, based on authorization codes. Both approaches have their advantages and disadvantages. Authorization codes are more flexible, since they depend on user needs rather than the location of a particular telephone he or she is using at the moment. On the other hand, authorization codes require users to dial additional digits, which can be a burden on those who make many calls unless speed dialing is available. Assigning restrictions to specific telephones would require that levels of service be changed every time offices are changed; this is possible with new digital telephone systems.

It may be that the government will want to pursue both options on an agency-by-agency basis. In some agencies, the telephones may restrict long-distance calling except for holders of authorization codes. In other areas where authorization codes are unworkable, such as teleservice centers where employees make many calls all day, telephones can be programmed so that codes would not be needed. Other agencies may decide to assign levels of service to telephones rather than to an individual via authorization codes. Some possible levels of service might include:

- *Local Government Service:* Can call only government phones in local area.
- *Local Service:* Can call local government phones and commercial (dial 9) lines. PBX or local telephone company Centrex blocks long-distance access.
- *Government Long Distance Allowed:* All above plus access to FTS.
- *Off-Net Long Distance Allowed:* All above plus ability to call nongovernment phones via FTS.
- *Commercial Long Distance Allowed:* All above plus access to commercial long-distance network.
- *Range Authorization:* Users in the previous three categories could be limited to calls in certain area codes or zones within the country.
- *International Calling:* All above plus international direct dialing.[44]

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[43] Information taken from President's Council on Integrity and Efficiency, "Consolidated Report on Federal Telecommunications System (FTS) Utilization," prepared by the General Services Administration, Office of the Inspector General, Mar. 16, 1987.

[44] List developed by OTA based on categories in "Detailed Description" manual of State of New York, Office of General Services, Division of Telecommunication.

Clearly, establishing better levels of service will not eliminate personal calling. It is still possible for the holders of authorization codes to make personal calls, to the extent allowed by their assigned level of service. Similarly, should levels of service be assigned to specific telephones, it is possible that the people sitting near telephones capable of making long-distance calls will use them for personal calling. However, a call-restricting approach could reduce the number of unofficial calls made on the government's telephones. The State of New York found that many employees do not need to make long-distance calls in the course of their work and therefore do not need authorization codes. Only 60,000 codes are in effect (there are 200,000 employees at locations served by the State telephone system). While codes are sometimes shared among members of a small workgroup, it is still clear that not every employee needs access to long-distance service at work. Only about 20 percent of codes assigned have a level of service that permits full national or international dialing privileges. The other 80 percent are restricted to government calls, off-network calls within the State, or commercial calls within selected area codes. Determinations about employees telephone needs are made by the individual agencies, not by the Division of Telecommunication.[45]

The Federal Government's telephone system must be nationwide and must serve many different agency and program needs. However, it appears that the principle of reducing the government's exposure to risk of unauthorized calls by reducing the number of employees with access to full-service telephones is a valid one.

GSA, as the governmentwide manager of the telecommunication system could greatly aid agencies in making use of new information technologies in two ways. First, it could continue, through its own research, to develop model methods for telephone system management and communicate these to the agencies. Second, it could serve as a clearinghouse for sharing innovative and useful approaches developed by the agencies.

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[45] Interviews with Peter Arment, State of New York, Division of Telecommunication, September 1986. It should be noted that the State of New York does use call accounting. Authorization codes are the backbone not only of the service levels, but also of the billing system. Long-distance calls are charged to the authorization code, so the call is billed to the proper department, even if the call is made from another office, or even from a State office building in another city.

Chapter 4

Electronic Work Monitoring Law and Policy Considerations

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Chapter 4

Electronic Work Monitoring Law and Policy Considerations

With perhaps the exception of marriage, no other institution in society is so pervasive as the employment relationship.[1] Roughly half of an adult's waking hours are spent at work. Societal attitudes regarding personal dignity, autonomy, and privacy, and the individual's sense of self are tied to the workplace. Electronic monitoring—the computerized collection, storage, analysis, and reporting of information about employees' productive activity[2] —may be an increasingly important element in the relationship between employer and employee, and in the overall context in which work gets done. Decisions about monitoring may affect the setting in which citizens work, and may therefore have a broader social significance.

Between 4 and 6 million office workers have their work measured by computers, and many millions more are affected by telephone call accounting.[3] Proponents of electronic monitoring, principally the vendors of monitoring equipment and software and some companies that have installed monitoring systems, say that monitoring provides employers with new tools for managing resources, allocating costs, improving productivity, controlling quality, and reducing waste, fraud, and abuse of employer property. At the same time, however, critics of work monitoring, principally some labor unions and civil liberties organizations, suggest that electronic work monitoring is destructive to the quality of work life and has damaging effects on workers' privacy, civil liberties, sense of dignity, and health.

This chapter is an attempt to provide the policymaker with a conceptual framework for addressing concerns over electronic monitoring, now and in the future. It begins by asking why monitoring has become a policy issue, and what is different about *electronic* monitoring that causes these concerns. It then examines which of these concerns are currently addressed by existing law and which are not. Finally, it provides the policymaker with a range of options from which to choose.

PART I: WHY IS MONITORING AN ISSUE?

Neither work monitoring, nor the application of technology to measure work, is new. As chapter 1 of this report illustrates, the detailed observation and recording of employee performance has been an integral part of American industrialization from the mid-1800s onward. During the early 1900s, work monitoring culminated in Frederick W. Taylor's "scientific management." While early work monitoring techniques were confined to pencil and paper tallies of performance, technologies such as the time clock, time stamps, and cyclometers were applied pervasively to the measurement of work.[4]

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[1] "We have become a nation of employees. . . .For our generation, the substance of life is in another man's hands." F. Tannenbaum, *A Philosophy of Labor* 9 (1951) (as quoted in Blades, "Employment at Will vs. Individual Freedom: On Limiting the Abusive Exercise of Employer Power," 67 *Columbia Law Review* 1404 (1967). Although the employment relationship is freely entered into, the need to earn a living, together with limitations the individual's qualifications and the ease with which he or she can be substituted, often place the worker at a disadvantage in determining the conditions under which he or she shall work.

[2] "Electronic work monitoring," "electronic monitoring," or just "work monitoring" are terms used interchangeably in this chapter and elsewhere in this report to include computer-based work monitoring and telephone service observation. Telephone service observation, although not typically computerized, is included because it is often used in conjunction with electronic work measurement techniques.

[3] See ch. 2.

[4] For a more complete discussion of early forms of work monitoring, see ch. 1 of this report.

Given this long history of work monitoring, two questions arise:

1. why is concern about work monitoring among management, labor, and public interest groups only now surfacing? and
2. why is the application of electronics to an old technique unique or different enough to cause this concern?

Simply put, the questions are "why now?" and "what's new?" The first question is addressed presently, while the second forms the discussion in the remainder of this chapter.

Although the question of "why now?" has no simple answer, it is possible to point to three broad trends that have contributed to the emergence of monitoring as a policy issue: the computerization of office work, the computerization of communications, and the rise of workers' expectations and rights in the workplace. The three types of monitoring considered in this report—computer-based monitoring, telephone call accounting, and telephone service observation—illustrate the way in which these trends have propelled work monitoring into the national policy arena.

The computerization of office work is less than 15 years old—less than half of the working lifetime of a white-collar worker.[5] Computerization has lead to rapid, fundamental changes in the quantity, quality, and organization of office work. As a result, conflicts are emerging between management and labor over how work will be designed; who will have a say in that design; and what the expectations of employee performance, flexibility, and privacy should be. The literature on the impact of automation on work is voluminous, and the reader seeking more information is referred to another OTA report, *Automation of America's Offices*.[6]

Table 11.—20 Unions With Positions Against Computer-Based Work Monitoring

Union	Estimated membership
Automobile, aerospace, and agricultural workers (UAW)	1,350,000
Communications workers (CWA)	550,000
Electrical workers	1,000,000
Electronic, electrical, technical, salaried, and machine workers (IUE)	160,000
Federal employees (NFFE)	150,000
Government employees (AFGE)	265,000
Government employees (NAGE)	300,000
Machinists (IAM)	940,000
Newspaper guild (TNG)	40,000
Office and professional employees (OPEU)	125,000
Postal workers (APWU)	320,000
Railway, airlines, and steamship clerks (BRAC)	200,000
Service employees (SEIU)	650,000
State, county, and municipal employees (AFSCME)	1,100,000
Steelworkers (USWA)	1,230,000
Teamsters (IBT)	2,000,000
Telecommunications workers (TIU)	50,000
Treasury employees (NTEU)	120,000
Typographers (ITU)	80,000
Utility workers (UWUA)	56,000

NOTE: Totals are rounded.

SOURCE: Westin, *Privacy and Quality of Worklife Issues in Employee Monitoring*, contractor report prepared for OTA, May 1986. Bureau of Labor Statistics, 1980; AFL-CIO estimates, supplementary inquiries at individual unions, 1984.

Computer-based monitoring is one example of how the computerization of office work has lead to the recent emergence of work monitoring as a salient issue. Since 1982, computer-based monitoring has been the subject of national TV news programs, a stream of newspaper and magazine stories, and several recent books. Although it has captured media attention, unions were the first principal critics of computer-based monitoring.[7] (Unions having positions against computer-based monitoring are listed in table 11). While the concerns of each union are not necessarily identical in details, a broad consensus seems to be that work speedups, enforced by close work monitoring, are bad because they create harmful *stress* among employees and also compromise the quality of work provided to the public. As an issue of job stress, unions see work monitoring—and particularly computer-based monitoring—as linked to *quality of worklife* issues, *worker solidarity*, *job design*, and *health* concerns. Worker *privacy* is also emphasized as a concern of the unions, particularly the rights of workers to see what records are being collected about their work performance.

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[5] U.S. Congress, Office of Technology Assessment, *Automation of America's Offices*, OTA-CIT-287 (Washington, DC: U.S. Government Printing Office, December 1985), p. 8.

[6] Ibid.

[7] During the course of this study, OTA spoke with a variety of union representatives having an interest in work monitoring, including the American Federation of Labor & Congress of Industrial Organizations (AFL-CIO), the Communications Workers of America (CWA), the Service Employees International Union (SEIU), Nine to Five: The National Association of Working Women (9 to 5), American Federation of State, County, and Municipal Employees (AFSCME), the American Federation of Government Employees (AFGE), and the Graphic Artists International Union (GAIU). In addition, 9 to 5 and AFGE were represented on this study's Advisory Panel. These unions, and many others, have taken a public stance against computer-based monitoring.

Unions represent only a fraction of the estimated 4 to 6 million monitored employees, but from a field study of 110 business, government, and nonprofit organizations conducted for OTA, it is also possible to offer some observations on the attitudes of employees in general with respect to computer-based monitoring. The field study revealed that *fairness* in monitoring is a critical factor in clerical and customer service employee acceptance.[8] The emphasis on fairness highlights the fact that both *process* and *substance* are involved in how employees respond to electronic work monitoring. In addressing process, employees seek genuine involvement in the design, testing, application, and subsequent adjustment of new office systems technology. Substantively, the perceived reasonableness of monitoring depends on: 1) the fairness of the standards set, 2) the fairness of the measurement process employed, and 3) the fairness of the way measurements are used in employee evaluation. A breakdown of these key issues is given in table 12.

Table 12.—Key Issues and Problem Areas in Monitoring Clerical and Customer Service Workers

Key issues/problem aspects
1. Fairness of work standards
Do standards fairly reflect the average capacities of the particular work force?
Will they create unhealthy stress for many employees?
Do they account for recurring system difficulties and other workplace problems?
Do they include quality as well as quantity goals?
Do they represent "fair day's pay for fair day's work?
Do employees share in productivity gains achieved through new technology?
2. Fairness of measurement process
Do employees know and understand how the measurements are being done?
Can measurement system be defeated, impairing morale of those willing to follow the rules?
Do employees receive statistics on performance directly and in time to manage work rate?
Is relationship between quality and quantity communicated by supervisors when discussing problems with performance levels?
Do supervisors communicate clearly that they are taking system/workplace problems into account?
Are group rather than individual rates used when such an approach is more equitable?
Is there a formal complaint process for contesting the way work data is used?
3. Fairness in applying measurements to evaluation
Are there meaningful recognition programs for superior performance?
Is work quantity only one of a well-rounded and objective set of appraisal criteria?
Does employee get to see and participate in performance appraisal?
Is there an appeal process from supervisor's performance appraisal?
Is ther a performance-planning system to identify and help performance problems?

SOURCE: Office of Technology Assessment, 1987.

The computerization of communications refers to the fact that the information moving within modern communication systems, such as the telephone, is increasingly transmitted, routed, stored, and processed in digital form by electronic computers. Because of the computerization of communications, the use of employers' telephone systems can be tracked with greater precision and comprehensiveness than was possible previously. Computer software in some modern Private Branch Exchanges (PBXs), for example, permits station message detail recording (SMDR), a form of telephone call accounting that records from which telephone a call was made, what access code was used, where the call went, and how long it lasted. The call-accounting system can then generate detailed, comprehensive reports of all of the telecommunication activities of every employee in a firm.[9]

Telephone call accounting is an example of how the computerization of communications has placed work monitoring on the public policy agenda. A pilot study of unofficial use of

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[8] Alan Westin, and The Educational Fund for Individual Rights, *Privacy and Quality of Work Life Issues in Employee Monitoring*, contractor paper prepared for OTA, May 1986; field study conducted during 1982-84, and updated at all 110 sites during 1985-86.

[9] See ch. 3 for a more detailed discussion of telephone call-accounting systems.

Federal Government long-distance telephone usage has been completed,[10] and the implications of this study for employee privacy caused concern in both Congress and the press.[11] Although most of these concerns were over the manner and method by which this study would be carried out (and are therefore addressed below), at least some of the concerns are over the purposes for which it might be used. One concern, in particular, is that call accounting might be used to discourage whistleblowers, to stifle dissent or union activity, or to limit news media access to information.[12] Plans are being made to audit Federal employees' long-distance calls on a regular basis, raising additional concerns about the vigilance with which privacy concerns are addressed. The Office of Management and Budget (OMB) has issued proposed guidelines on compliance with the Privacy Act, in contemplation of a permanant call-accounting capability in executive agencies.[13] In the private sector, where about 30,000 call-accounting systems have been sold,[14] there are similar concerns over privacy and the potential for misuse. The issues surrounding the purposes of call accounting, in both the public and private sector, are considered in more detail below.

Finally, heightened public and worker expectations regarding privacy, health, and work-life quality help to explain why monitoring has emerged only recently as a public policy issue. The period from 1965 to 1986 saw the growth of concern over privacy in the public consciousness,[15] in the courts and legislatures,[16] and in the scholarly literature.[17] The concern over privacy during the past 20 years largely tracks the introduction and proliferation of the computer as a basic tool for the emerging information economy. It is no surprise, therefore, that privacy issues have made their way to the office environment, where computers have had their most pervasive influence. As we will see, however, the concept of privacy may be inadequate to address most of the issues involved in work monitoring.

At the same time as privacy became an important theme in public policy, there were rising medical, media, and public concerns about the health effects of stress at the *office* workplace. Studies showed that stress among office workers was a contributing cause of adverse health impacts, such as heart disease, and that *clerical workers*—because of their "high demand/low control" working situations —were among the occupations in office work most "at risk."[18] Although the studies did not find harmful stress dependent on computer use (high levels of stress did show up in high-production, closely monitored clerical work that was not computer-based), the growing number of "machine paced" and "machine monitored" computer-based clerical workers generated similar concerns over stress and health.

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[10] The unofficial use of the Federal Telecommunications System (FTS) or other government-provided long-distance services is illegal. 41 CFR 201-38.007 and 5 CFR 735.205. For a detailed discussion of the "Telephone Call Reduction Initiative," conducted by the President's Council on Integrity and Efficiency (PCIE), General Services Administration, and the Office of Management and Budget, see ch. 3.

[11] In March of 1985, Rep. Don Edwards (Chair, Subcommittee on Civil and Constitutional Rights) and Patricia Schroeder (Chair, Subcommittee on Service) sent letters questioning OMB Deputy Director, Joseph R. Wright, on the privacy problems involved with the study. The ACLU, The New York Times ("U.S. Phones Raise Issue of Privacy: New Equipment Would Provide Detailed Record of Calls," Burnham, Mar. 17, 1985), The Federal Times ("Planned Phone Audit Brings Blast From Several Groups," Montague, Mar. 25, 1985) and the Washington Post ("U.S. Agencies Use High Tech To Curb Workers," May 9, 1985) and considerable televisions coverage all brought public attention to the subject.

[12] Letter of Rep. Edwards to Joseph Wright, question No. 6. Mr. Wright's response was that the program would not be looking at local calls, and that long-distance calls to news media, congressional offices, public interest groups, etc., would be considered business calls for purposes of the study.

[13] Notice by the Office of Management and Budget, 51 Federal Register 18982 (Friday, May 23, 1986).

[14] See ch. 3.

[15] See e.g., *The Dimensions of Privacy: A National Opinion Research Survey of Attitudes Toward Privacy*, conducted for Sentry Insurance by Louis Harris & Associates and Dr. Alan F. Westin, 1979. The survey revealed, among other things, that strong majorities of full-time employees believed that it was no longer proper for employers to ask job applicants about many topics that had once been traditional to collect (e.g., information on an applicant's spouse, neighborhood, membership in organizations, residential status, arrest, and similar matters). A 1983 Survey, also by Harris & Associates, reaffirmed the importance of privacy in the public mind.

[16] Over 20 Acts of Congress have been passed since 1970 to address problems of individual privacy. See: U.S. Congress, Office of Technology Assessment, *Federal Government Information Technology: Electronic Record Systems and Individual Privacy*, OTA-CIT-296 (Washington, DC: U.S. Government Printing Office, June, 1986), p. 15. Most recent legislative efforts to protect privacy include the *Counterfeit Access Fraud and Abuse Act of 1985* and the *Electronic Communications Privacy Act of 1986*. None of these statutes are addressed specifically at employment, however. At the State level, 21 States have passed legislation dealing specifically with the confidentiality of employee records, and 34 States have statutes concerning the use of the polygraph in employment. *Compilation of State and Federal Privacy Laws* (1984-85 ed.) (Washington, DC: Privacy Journal), and January 1986 supp.

[17] See, e.g., Robert Ellis Smith, *Workrights*, Westin, *Computers, Personal Administration, and Citizen Rights*, U.S. National Bureau of Standards Special Publication 500-50 (1979), and the report of the U.S. Privacy Protection Study Commission, *Personal Privacy in an Information Society* (1977). See also: OTA, *Electronic Record Systems*, op. cit.

The workplace context in which privacy and health concerns fermented was also changing. Women comprise roughly half of the work force in America today and are especially vulnerable to the impact of microelectronics on the work environment.[19] Accompanying shifts in the structure of American industry, from heavy industry to service and information sectors, was a growing recognition of workers' legal rights—quite apart from those obtained by collective bargaining.[20] These new rights are being introduced primarily at the State level, and include right-to-know, privacy, safety, and discrimination laws. What impact the increasing alarm over drug abuse and subsequent drug testing will have on this trend toward greater legal protection for workers is uncertain.

Of course, understanding the factors that have made monitoring into a public policy issue is of little help in understanding what the specific issues are, and why *electronic* monitoring raises problems that differ from conventional forms of work monitoring. Part II addresses these questions.

PART II: FRAMING THE DEBATE

As seen in the first section of this chapter and elsewhere in this report, electronic monitoring raises a variety of distinct concerns ranging from worker participation in job design, to worker solidarity, to privacy, to stress and health, to worker dignity, to quality of worklife, and more. Yet not all of these concerns are of the same type; some relate to the way that electronic monitoring is implemented in a given work environment, some to the use of monitoring to drive the worker, some to the use of information gained in monitoring, and some to the very fact that monitoring is conducted at all. Moreover, these concerns differ, depending on the type of monitoring being discussed; computer-based monitoring raises the issue of stress, while telephone call accounting engenders concerns over privacy. Clearly, electronic monitoring is a multifaceted issue, with no simple term of analysis.

Furthermore, upon close scrutiny, objections to electronic monitoring resist categorization in terms of traditional legal and normative principles. As the legal analysis in part III of this chapter shows:

- Except when monitoring is used for illegal ends, even some of its more onerous forms (e.g., machine pacing) are entirely legal.
- The concept of privacy, whether based on law or on ethical considerations, seems too narrow to address many concerns over the types of employee monitoring considered

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[18] Of 130 common occupations, the following 12, ranked from most to least stressful, were said to be most stressful:
1. Laborer
2. Secretary
3. Inspector
4. Clinical lab technician
5. Office manager
6. Foreman
7. Manager/administrator
8. Waitress/waiter
9. Machine operator
10. Farm owner
11. Miner
12. Painter

(as reported in Meeks, "Worker's Compensation and Stress," 37 *CPCU J.* 171, 174-75 (1984) [based on a 1977 NIOSH study]). See ch. 2 of this report, which discusses the NIOSH study in greater detail.

[19] See: Hartmann, Kraut, Tilly (eds.), *Computer Chips and Paper Clips: Technology and Women's Employment* (Washington, DC: National Academy Press, 1986).

[20] See, e.g., "Beyond Unions: A Revolution in Employee Rights is in the Making," *Business Week*, July 8, 1985 (cover story); and "The New Industrial Relations," *Business Week*, May 11, 1981; and more recently, *U.S. Labor Law and the Future of Labor-Management Cooperation*, BLMR 104 (Washington, DC: U.S. Department of Labor, Bureau of Labor-Management Relations and Cooperative Programs, 1986).

in this report. The performance of tasks at work is, for the most part, an inherently public activity, which is done on behalf of the employer at the place of employment. An employee would likely find it difficult to assert a right of privacy in his or her performance at tasks such as computer claims processing.

- Although some legal doctrines may be implicitly aimed at vindicating a person's claim to bodily or mental integrity, autonomy, or dignity, the law recognizes no "right of dignity" or "right of autonomy" as such.[21]

Not only does monitoring escape the "net" of what is normally considered private information, its infusion into the workplace seems so gradual an extension of past practices that, if there is no real basis in doctrines of privacy for objecting to the proverbial supervisor with a clipboard, there *seems* to be none to using a computer to do much the same thing. As chapter 1 explained, some form of work monitoring has always been a part of employment, and the fact that technology introduces new or more efficient ways to monitor work may not be in itself an obvious incursion on privacy. Some reason must therefore be found why monitoring work by means of microelectronics is significantly different from past forms of monitoring, and what this difference means in terms useful for formulating policy.

Table 13.—A Framework for Addressing Electronic Work Monitoring

	Concern	Criteria
Purpose of monitoring	Fairness	Relevance Completeness Targeting
Manner and method of monitoring	Autonomy Dignity Privacy	Intensiveness Intrusiveness Visibility Type Leakiness Permanence
Effect of monitoring	Health Stress	Frequency Continuousness Regularity Control

SOURCE: Office of Technology Assessment, 1987.

To that end, OTA has developed an analytical framework that draws on familiar concepts and applies them to the new capabilities and characteristics of electronic monitoring. Table 13 summarizes this framework. In general, most claims about the deleterious effects of electronic monitoring can be understood as statements about *its purpose, its manner and method* of implementation, or *its effects*. It is this framework that guides the discussion in the rest of this chapter. In this part of the chapter, the purpose/method/effect breakdown is examined, in light of the characteristics of monitoring technologies, to show why electronic monitoring may present unique problems for the relationship between employee and employer. Then, in part III, the variety of legal mechanisms for addressing problems in the purpose, method, and effect of monitoring are examined. Finally, the chapter looks at the types of claims the law does *not* address, and explores the options Congress may wish to pursue in light of these unresolved issues.

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[21] Consider, for example, the common law torts of:

(1) **Battery**, which is an intentional and unconsented-to contact, and in which "[t]he element of personal indignity has always been given considerable weight";

(2) **Assault**, which stems from an interest in freedom from apprehension of a harmful or offensive contact (as distinguished from contact). This individual is protected against a purely mental disturbance of his personal integrity. Damages are recoverable for mental disturbance (fright, humiliation, etc.) as well as any physical illness that flows from it, but an assault must create an apprehension of immediate physical harm; and

(3) **Infliction of Mental Distress**, an action in which the infliction of mental injury itself became vindictable. It is most often found in cases of intentional, flagrant acts, where "extreme outrage" of a defendant's act allows recovery ("your husband has been in an accident"—or situations in which there is repeated hounding or threatening of the plaintiff). Mental distress must exist and be severe, and no recovery can be obtained for mere profanity, obscenity or abuse.

W.L. Prosser, *Prosser on Torts*, 4th ed. (St. Paul, MN: West Publishing Co., 1971), pp. 80½ *et seq.*

Some court opinions suggest a close correlation between common law rights of privacy and individual dignity, autonomy, and personal freedom. For example, in Gerety, "Redefining Privacy," 12 *Harvard Civil Rights and Civil Liberties Law Journal* 233-296, the author reviews several opinions dealing with the common law right of privacy, and concludes that:

> . . . [n]o fair measure of damages—general or specific—can be arrived at until we acknowledge that it was not the unexcused touching or the unwarranted search as such that caused the injury. What was injured, rather, was **that peculiar aspect of dignity and freedom invested in reasonable expectations of privacy**.

Id. at 265 (emphasis added). Although it may be the case that privacy rights entail interests in dignity and freedom, the converse does not necessarily follow: interests in dignity, freedom, and autonomy are not necessarily privacy interests. To vindicate interests in dignity and autonomy, in other words, requires a separate and independent basis in law, such as privacy.

Purpose

Concerns about the purpose of monitoring refer to the ends that the employer seeks to further through a given monitoring technique. By and large, electonic work monitoring may be used to measure and document a variety of employee transactions, for purposes of:

- planning and scheduling personnel and equipment;
- evaluating individual performance and personnel decisions (promotion, retraining, discharge, etc.);
- increasing productivity by increasing individual performance (feedback on speed, etc., and work pacing);
- providing security for employer property (including intellectual property) and personnel records;
- investigating incidents of misconduct or crime, or human error; and
- increasing management control, discouraging union organizing activities, identifying dissidents, etc.

Attacks on the purpose of a monitoring system can be understood as complaints about its *fairness*. While illegal monitoring purposes present little difficulty for finding the practice unfair (see part III), its use for currently legal purposes is more problematic. In general, employees and unions oppose the use of monitoring for purposes which, while legal, they regard as unfair. For example, electronic evaluations of employee performance that reflect inadequately or arbitrarily the task the employee is performing, or that place demands on workers' time and energy that are unrealistic or unduly burdensome, are likely to raise objections by employees and unions.

Because electronic monitoring represents an unprecedented ability to measure job performance exhaustively and in great detail (see chs. 2 and 3), several monitoring system characteristics become key items in ensuring fairness; particularly the *relevance*, *completeness*, and *targeting* of the monitoring.[22]

Relevance.—A work monitoring technique that is relevant is one that measures performance related to the goal that the monitoring seeks to further. Thus, if billing customers in a timely fashion is the goal, a relevant measure would be whether customers were billed on time. A less relevant measure would be the number of "fields" in a customer account database that are filled in per hour.

Completeness.—A monitoring system is complete if it takes into account all, rather than some, of the performance parameters relevant to a given goal or behavior. If, therefore, a job entails both talking with as many customers as possible during a given time and handling customer needs in a satisfactory way, a monitoring system that measures only the number of customers handled is incomplete.

Targeting.—A monitoring system that generates information on particular individuals within an organization, rather than the group or work process of which that individual is a part, is a targeted system. A monitoring system that reveals only aggregate organizational performance is "untargeted" or categorical.

Using these definitions as measures of the fairness of monitoring technologies, one can begin to understand why new technology raises issues of fairness of purpose. For example, in computer-based monitoring, where a computer is used to tabulate total keystrokes during a given period of time, the question of the *relevance* and *completeness* of keystroke monitoring to the overall task can become a point of contention. In contrast to nontechnological methods of measuring keystrokes, such as a typing test (where typing speed may be relevant only to qualifying for a job), computer-based keystroke monitoring may make typing speed an end in itself, without regard to the purpose for which speed is valued—meeting a deadline as part of an overall project goal, for example. An overreliance on typing speed might also become an isolated, incomplete measure of job performance.

In telephone call accounting, issues of *completeness* and *targeting* become important to ensuring fairness. If, for example, the purpose of the audit is to reveal excessive numbers of long-distance calls, failure of the call-accounting system to also reveal extenuating circumstances may be deemed unfair. If the call-accounting audit targets specific individuals, rather than "cost centers," as abusers of long-distance service, failure to implement special procedures for giving notice to that individual, hearing explanations, and allowing challenges may give rise to charges of unfairness.

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[22] These factors are illustrative of the types of concerns raised because of new technologies; they are hardly exhaustive, and the reader may have his or her own in mind.

In service observation monitoring, fairness may require providing safeguards to subjective supervisory judgments about the operator's quality of customer service. In other words, if the purpose of the monitoring is to evaluate overall employee performance, it may be claimed unfair unless a more *complete* method of evaluation is used.

Many of the complaints reported to OTA about electronic monitoring suggested that *monitoring may itself change what counts as a relevant or complete measure of job performance.* If, for example, a job previously entailed finishing a given batch of insurance claims by the end of a week, a monitoring system that only measures the number of claims finished per hour may change that job by changing what counts as a relevant measure of performance, and by foreshortening the time in which a goal is to be achieved. The means for assessing performance may often become an end in itself.

Similarly, a monitoring system that is incomplete, or measures only one of several job parameters, may unintentionally change the nature of the job itself. If, for example, only quantity is measured, quality may be sacrificed.

Manner and Method

Method refers to what information is gathered by monitoring, how it is gathered, and what is done with it once gathered. As such, issues about the manner and method of electronic monitoring reflect concerns about worker *autonomy*, *dignity*, and *privacy*. Care should be taken in reading these words in a too narrow or legalistic way—particularly the word privacy. As we shall see, few of the concerns electronic monitoring and privacy can be vindicated in a court of law. Nevertheless, complaints about a loss of autonomy in job decisionmaking, about the indignity of being "watched" by a machine, or the invasive feeling of having one's every move at work recorded, reflect deeply held societal values. In a work environment, we expect, and indeed hope, that our performance will be evaluated by our superiors, yet we may balk at the thought that someone will be constantly watching "over our shoulder."

The reason why concerns about autonomy, dignity, and privacy are raised in electronic monitoring has to do with the fact that computers are ever-vigilant; unlike human supervisors, they do not tire of observing and recording the minutiae of employee performance. In some cases, computers are also being used to pace workers to speed their work rate.[23] In the process of using computers as surrogates for immediate human supervision, employees may complain of "dehumanization" and isolation. They may perceive themselves as a component of a system, rather than as human actors involved in and concerned with a larger enterprise. It is not difficult, under such circumstances, to understand complaints about a loss of autonomy and dignity:

> The electronic monitoring is one of the most offensive and pernicious aspects of our jobs. 1984 is nowhere more apparent than in the electronically monitored Equitable office. We "clock in" at 7 a.m. and from then until the end of the day, the VDT is counting every keystroke. At the end of the day, managers have a computer read-out from which productivity is determined and then averaged with subjective factors such as attitude to determine our rate of pay. Being watched, counted, and paced by a machine makes it very difficult to take pride in your work.[24]

It should be emphasized, however, that the potential for creating an onerous work environment through electronic work monitoring is not always realized. Indeed, whether computer-based work monitoring becomes "offensive and pernicious" depends crucially on *the manner and method* by which the system is administered, and what the overall work environment is like. For example, one of many interviews conducted for OTA, by Alan Westin, told of a suburban newspaper's circulation and classified ad department that monitored records via visual display terminal (VDT) in a way that minimized complaints:

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[23] See ch. 2.

[24] From Alan Westin, and The Educational Fund for Individual Rights, *Privacy and Quality of Work Life Issues in Employee Monitoring*, contract paper prepared for OTA, May 1986, p. 76; taken from testimony before House Subcommittee (?) 1984.

> The management has a daily job chart that records each operator's time on and off the machine, errors made, and accounts handled. "I don't mind that at all," Alice said. "They don't judge us on the numbers here; they take into account changes in the business service we are making, and the way customers—some of them—need more service than others. Its not a Big Brother thing." She also noted that management's attitude led employees to cooperate informally to take heavy loads off one another when the calls piled up at one or two stations. Alice also said that the pay was "OK" by not "great" at this newspaper, but she liked the job very much because "the benefits are excellent, you can take courses at night and have the company pay for it, and people you work with are fun to be with."

Several characteristics of electronic monitoring systems seem to be key to preserving worker autonomy, dignity, and privacy:

- **Intrusiveness.**—Intrusiveness is concerned with the degree to which monitoring involves probing the individual's body or mind. A monitoring technique that is intrusive is one that requires an individual to reveal facts about his or her thoughts, beliefs, or states of mind; to submit samples of body fluids or tissues, or to expose body parts not ordinarily exposed. A monitoring technique is *not* intrusive if the information collected thereby is obtained without probing into the person's mind or body. Note that intrusiveness concerns *how* information is gathered, and *not what* that information is.[25] Techniques may be intrusive even if the information they yield is information ordinarily observable.
- **Intensiveness.**—Intensiveness is the amount of detail about a worker's performance that monitoring reveals. An employee log of personal calls made on an employer's phone reveals only the number of personal calls. A telephone call-accounting system reveals much more detail; i.e., length of call, destination of call, the number called, which phone was used, time of day, etc.
- **Visibility.**—Visibility refers to the degree to which monitoring is apparent to the person being monitored. A computer-based monitoring system that reports back to the employee information on the number of keystrokes entered is more highly visible than one that reports this information only to supervisors. In general, the more visible the monitoring system, the more control the employee has in matching his or her performance to expectations. Visibility is important in part because of its influence on the psychology of power relationships at work. Whereas unaided monitoring by a supervisor may require a face-to-face confrontation with the employee—which both informs the employee that he or she is being monitored and "humanizes" the monitoring by allowing explanations and personal interaction—electronic monitoring allows the supervisor to remove him or herself from the situation and use the machine as intermediary, thereby avoiding the human relationships that act as a corrective to overly rigid work environments.
- **Type.**—Type refers to the nature of the information gathered through monitoring. Information can be either *substantive* or *transactional*. Substantive information concerns the actual content or meaning of communications or documents. Transactional information is information about substantive information; the number or type of messages sent, to whom, how often, in what sequence, etc. Telephone service observation is an example of monitoring substantive information, since it

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[25] For example, pumping the stomach of a person suspected of "possessing" illegal drugs is intrusive. See, e.g., *Rochin v. California*, 342 U.S. 165 (1952) (The fourth amendment guarantees physical security of one's person against procedures that "shock the conscience.")

reveals the content of employees' phone conversations. Telephone call accounting, by contrast, reveals only transactional information, such as the destination called, length of call, cost of call, etc. The distinction between substantive and transactional information can become blurred, especially where computers are used to piece together patterns of transactions, thus allowing inferences regarding the substantive content of those transactions. The distinction is important, since both societal expectations and the law generally endow substantive information with greater importance and protection.

- **Leakiness.**—Leakiness refers to the ability of information gathered by monitoring for one reason to be used for another. Thus, information gathered through telephone call-accounting systems tends to be leaky, because the information gathered can be used to track individuals' extrawork activity, despite the fact that it was collected for purposes of detecting abuse. Computer-based keystroke monitoring, on the other hand, tends to be relatively "tight," since the information gathered often has little use outside of the context of job performance. Like other criteria, leakiness is a factor in determining the legality of certain information practices.[26]
- **Permanence.**—Permanence refers to whether the information gathered by monitoring becomes a record, and how long that record remains in an employee file. Some information obtained by monitoring is transient, and never becomes a record. A computer-based monitoring system that determines when the employee has finished a certain job and is ready to move on to the next (i.e., machine pacing) may generate no records, and is thus transient. Telephone service observation, on the other hand, may entail writing comments on an evaluation sheet, which then becomes part of the employee's permanent record. Permanence is important from a privacy standpoint, since privacy law very often regulates what may be done with records that are permanent.[27]

The way in which these factors interact with electronic monitoring to give rise to problems of autonomy, privacy, and dignity can be illustrated by a brief consideration of the technologies considered in this report.

Computer-based monitoring may be implemented in an *intensive* and *invisible* manner. In other words, the computer can be used intensively to chart periods of peak performance at a VDT, time spent away from the terminal, time spent idle, and other minutiae of job performance. The monitoring may be of extremely low visibility—the employee may not know *how* she is doing, but does know *that* she is being "watched." The knowledge that one's every move is being watched, without an ability to watch the watcher, can create feelings that one's privacy is being invaded and that one is an object under close scrutiny. Being subject to close scrutiny without an ability to confront the observer may mean the loss of a feeling of autonomy. This may have subtle yet profound implications for interpersonal power relationships at work. In French philosopher Jean Paul Sartre's analysis of relationships between persons, he observes that:

> . . . [w]ith the Other's look the "situation" escapes me. To use an everyday expression which better expresses our thought, *I am no longer master of the situation.*[28]

Activities at work that cannot in fact be observed, measured, and thus controlled, are by default discretionary activities. In the past, the time an employee spent going to the bathroom, talking with his or her spouse, pausing between tasks, and so on, were largely discretionary. Obtaining detailed information on such activities was either impossible, impractical, or not cost-effective. What constituted "acceptable" employee performance was in part a function of the information a supervisor could collect. There was some domain of behavior which an employee could call his own, and for which he knew he was unaccountable.

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[26] See part III of this chapter.

[27] See the discussion of "system of records" under the Privacy Act in part III.

[28] Sartre, *Being and Nothingness*, as reprinted in *The Philosophy of Jean-Paul Sartre* (New York, NY: Vintage Books, 1972), p. 203. Emphasis in original.

But, because the computer dramatically enhances the intensiveness of human observation, the employee may feel powerless and exposed under the gaze of electronic monitoring. And, since face-to-face exchanges between employee and supervisor often involved negotiations and room for human error and "slippage" in the performance of tasks, the employee's relationship to a supervisor was on more even footing. But with systems of evaluation that are invisible to the employee, the transactions between people that allowed the employee to assert his autonomy may be minimized.

Different sorts of concerns about privacy and autonomy are present in telephone call accounting. Call accounting raises questions about the *permanence* and *leakiness* of records generated. The legal implications of these factors are dealt with below, but here we call attention to the effect of the existence of records on employee behavior. If records of all calls are being kept, the employee knows he or she may be required to justify those that are "questionable." Under these circumstances, an employee may be less inclined to make calls that cannot be easily justified as business calls. This may have an impact on "whistleblowers"—those seeking to disclose unethical or illegal corporate or government activity. Although reprisals against the whistleblowing employee may be forbidden by law or company policy, the knowledge that all of one's long-distance or even local calls are being accounted may nevertheless act to "chill" such activities. Even calls that can be justified as "business" or "official" may be subject to supervisors' judgments regarding propriety or business sense. And, although the employer does have a right to protect its property by ferreting out nonbusiness calls, the process of identifying the destination and identity of nonbusiness calls may compromise an employee's desire to conceal the identity of persons he or she is calling.

In short, automated telephone call accounting systems, if implemented in a pervasive fashion throughout government and business, may go "wide of the mark," and have incidental impacts on employees' calling decisions, and perhaps on the employer-employee relationship, which were not anticipated. While in the past, employers had no choice but to treat employees *as if* they were honest,[29] the ability to store and process massive amounts of data may reverse this *de facto* presumption. Implicit in the installation of call-accounting systems is the proposition that at least some employees cannot be trusted in their use of the employer's property. While the proposition may in fact be correct, the system nevertheless audits the calling activity of *all* employees, treating each as a potential abuser of facilities. Moreover, as the ability to detect abuse is refined through technology, the standard of what constitutes an abuse may be lowered—while previous technology capabilities only allowed an employer to pay attention to extraordinary costs, new telephone call-accounting systems may allow assessments of calls that are "unnecessarily long" or "redundant."

Customer service observation shares many of the same characteristics with other monitoring systems. *Visibility* seems an important factor in assessing the manner and method in which customer service observation is carried out. The practice of listening in on employee telephone conversations with customers is not new, nor is it the result of recent technological innovations. It is also not essentially *electronic* monitoring, but instead a variant on human supervision and observation of employees. But, since today's technology permits a supervisor to listen in on an extension at a remote location with no audible "click" or diminution in volume, service observation is also a relatively low visibility form of monitoring. These factors have lead at least one organization, the Newspaper Guild, to complain that

> . . . the [employee's] inability to tell under the present equipment whether or not she is being monitored has inevitably given rise to feel-

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[29] The basic tool for measuring abuse—the monthly telephone bill—was inefficient (requiring a human to scan and "flag" expensive calls) and revealed only flagrant abuses.

> ings of concern, nervousness and insecurity and has made the job . . . additionally and unnecessarily burdensome.[30]

In addition, telephone service differs from other forms of monitoring in that it reveals a substantive *type* of information; i.e., the content of employee conversations. As is discussed in part III of this chapter, privacy concerns are most often present where the type of information being gathered is substantive, rather than transactional. Because of this, courts have held that employers can only listen into business, and not personal, phone calls. Recognizing employers' needs to monitor the quality of service its representatives offer, no court has held service observation to be unlawful per se.

Effects

Unlike concerns over the purpose, manner, and method of monitoring, concerns over its effects are more tangible, less value laden, and are directed at the physical and psychological well-being of the employee. Because of this, most parties opposing monitoring have couched their arguments in terms of observable, objective effects on employee health caused by the stress involved in working at a monitored job. As we saw in chapter 2, however, proving that monitoring causes stress can be very difficult, and reliable data hard to find.

Electronic monitoring may create new demands on employee time, attention, and speed that give rise to concerns about stress. Among the factors that cause these concerns are the *frequency*, *continuousness*, *regularity*, and *control* involved in the monitoring. Each of these is described and discussed below.

- **Frequency.**—Frequency refers to how often the act of monitoring takes place. A call-accounting audit or computer-based keystroke monitoring that is conducted once a year is obviously less frequent than one that is conducted daily or weekly. Frequency is an important criterion because in combination with other criteria, such as *continuousness* and *regularity*, it may make the difference between monitoring as sporadic "spot checks" for efficiency and monitoring as a part of the daily job environment.
- **Continuousness.**—Continuousness is a measure of how constant a monitoring technique is. It is closely related to *frequency* and *regularity*, but refers to the duration of and intervals between monitoring. For example, a computer-based monitoring system that records every transaction, including time spent away from the keyboard, during an 8-hour workday would be highly continuous. A similar system that recorded only when the employee logged on and logged off would be relatively noncontinuous.
- **Regularity.**—Regularity refers to the predictability of intervals between monitoring. Thus, a telephone call-accounting audit conducted every month is highly regular; a random audit is not. Regularity is an important criterion, because it affects such issues as actual or constructive knowledge of being monitored, and it may play a factor in chronic stress (if monitoring is highly irregular, the employee may have to stay constantly "on guard" to the possibility of monitoring).
- **Control.**—Control refers to the ability of the employee to set his or her own pace of work, and to use discretion in organizing and executing a task. An employee who can determine the pace at which discrete tasks, such as filling out claim forms, are completed has relatively greater control than one who doesn't.

Electronic monitoring may involve changes in each of these factors, and may therefore cause greater stress than other forms of observing or measuring employee performance. In computer-based monitoring, for example, an employee's *control* over the pace of work may be given over to the machine; when one claim form is filled out, another pops up on the screen, and delays in processing the second are being recorded. The machine sets the pace. This may conceivably cause stress. On the other hand, in customer service observation, *continuousness* and *regularity* may be the factors causing stress. Whether these, or any other, characteristics of electronic monitoring factors do in fact cause stress is the subject of some debate, as will be discussed in part III.

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[30] From proceedings of an arbitration of a grievance filed by the Newspaper Guild against the Boston *Herald Traveler*, *Boston Herald Traveler Corp.*, Case No. 1130-0291-68, arb. award, Nov. 12, 1969; as cited in Alan Westin, and The Educational Fund for Individual Rights, *Privacy and Quality of Work Life Issues in Employee Monitoring*, contractor paper prepared for OTA, May 1986, p. A-16.

Where Is the Future of Monitoring Headed?

The full extent of electronic monitoring techniques may have yet to be realized, and we might see monitoring expand into more and different jobs. The only limit, in principle, is the technology itself. Advances in technology may allow a greater range of less routinized tasks to be monitored. Sophisticated software design, called expert systems, in combination with the computerization of most office activity, may enable tracking the complex transactions of bank loan officers, sales and management personnel, and stock brokers. Profit center accounting software, for example, can keep accurate and timely information on such items as expense account and investment activity, interdepartmental funds transfer, and business expense structure and account turnover. Since many expert systems are applied to assist physicians in diagnosing disease, it is conceivable that such systems could also be used to monitor diagnosis and method of treatment decisions. Depending on the reliability record of these expert systems, and their acceptance in the medical community, compliance with expert systems' "decisions" may become *prima facie* evidence of a standard of due care for purposes of determining liability for negligence.

Advances in technology could change monitoring in the following ways:

- More types of information, including information about employees' behavior out of work, may become increasingly available.
- A greater amount of information about employee performance is now available through the use of technology. Sophisticated use of the computer to edit and digest this information allows it to be put to practical use.
- In general, the means for obtaining information about the individual are less physically intrusive than would be possible without technological methods.
- The storage capacities of modern information systems permits more information about employees to be retained as records. The growing use of computer networks also permits employee records to be distributed and shared more easily than paper folders.

Table 14.—Factors Affecting Electronic Monitoring

Factors favoring increased monitoring:
- Economics and increasing sophistication of the technology
- Labor market trends
- Macroeconomic trends
- Employer liability
- Vendor bandwagons
- Technological imperatives

Factors limiting increased monitoring:
- Employee backlash, morale, & turnover
- Diminishing returns
- Job deskilling or upgrading
- Information overload
- Management priorities

SOURCE: Office of Technology Assessment, 1987.

Technology is not, as a practical matter, the only limit on electronic monitoring. A variety of factors, aside from legislation, may influence the way in which monitoring technology is eventually used. The factors can be grouped into those that tend to favor an increasing amount of monitoring, and those that tend to limit monitoring. They are discussed below and summarized in table 14.

Factors Favoring Increased Monitoring

Because purchasing, maintaining, and using an electronic work monitoring system often involves considerable expense, monitoring is unlikely to be done gratuitously. Beyond achieving the stated goals of enhancing productivity or quality, or detecting and combating waste, fraud, and abuse, several factors in combination suggest that work monitoring may increase, both in terms of the sheer volume of businesses that monitor and the variety of monitoring techniques and work environments. Some of these factors include:

- **The economics and increasing sophistication of the technology.**—In the past, the economics of monitoring tended to work against intensive mass surveillance; paid employees were required to observe other employees. Modern monitoring techniques alleviate this fixed cost, labor-intensive approach, and substitute an approach with a near-zero marginal cost, which is capital-intensive. Monitoring systems may become cheaper to maintain than the cost of abuse or inefficiency in the labor force. And, although it is easy to overstate the importance of new technologies,[31] the permeation of microelectronics into most office technology means that monitoring can be fully integrated into work processes without the need for elaborate and costly independent measurement devices. Computer terminals and PBXs, for example, can be monitored through relatively simple and inexpensive changes in software.[32]

- **Labor Market Trends.**—Organized labor's share of the work force is currently between 18 and 19 percent of the nonagricultural labor force in America (down from a high of 35.5 percent in 1945), and it is expected to decline further over the next 15 years.[33] There is a concomitant shift in jobs from the manufacturing to service sector; precisely the sector in which monitoring is highest and unionization weakest. It does not necessarily follow from this that employee rights are being diluted,[34] but it may divert the source of employee rights from the provisions of labor-management contracts to statutory or common law; areas which, as we have seen, provide a paucity of protection against monitoring.
- **Macroeconomic Trends.**—Increasingly competitive international markets in the private sector, and decreasing agency budgets in the public sector, force employers to trim expenses, including those associated with labor. Monitoring is one way of accomplishing this.[35] At the same time economic insecurity within the labor market over finding and keeping a job tend to blunt the incentive of employees to "rock the boat," particularly if it would entail lawsuits against employers.
- **Employer Liability.**—For a variety of reasons, it is the employer that generally suffers economic losses from the wrongdoings of its employees. Product liability, negligence, trade secret, and even criminal laws often ensure this result. Furthermore, plaintiffs in civil suits often look to the employer's "deep pocket," rather than to just the employee, for redress. Jury awards may be very high. Under these circumstances, it is not merely prudent, but in fact mandatory, that the employer exercise a degree of oversight and control over its employees. Electronic monitoring may often be the least expensive and most thorough way of facilitating this.[36]
- **Vendor Bandwagons.**—Vendors of computer-based monitoring and telephone call-accounting software have an obvious interest in promoting their products. While some vendors are sensitive to privacy and

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[31] For example, keystroke counters, called "cyclometers," were available for typewriters in 1913, and Taylorism developed a variety of sophisticated techniques for measuring output, sampling piecework, and counting units of production. See, e.g., Lee Galloway, *Office Management: Its Principles and Practice* (New York, NY: Ronald Press, 1919); and William Schulze, *The American Office: Its Organization, Management, and Records* (London: Key Publishing, 1913).

[32] The Integrated Services Digital Network (ISDN) may do much to accelerate this trend toward integration, since all transactional information can be reduced to commensurate, digital form. The first critical steps toward ISDN have already been taken, and will give users access to a broad range of communications and data processing services. See: Robert Rosenberg, "The Digital Phone Net Finally Starts Taking Off," *Electronics*, Aug. 21, 1986, pp. 57-61.

[33] "Beyond Unions," *Business Week*, July 8, 1985, pp. 72-77.

[34] Some think that the case is just the contrary: "Some business leaders think they will get a union-free environment, but what they may get is a legalized environment," according to Harvard labor law specialist, Paul Weiler, as quoted in *Business Week*, July 8, 1985, p. 73.

[35] A press release by OMB in support of its Telephone Call Reduction Initiative said, for example, that "the PCIE and GSA/OMB initiatives will address the reduction of the Government's long distance phone costs."

[36] For example, by using a computer to track the accuracy of records maintained by employees to avoid liability for warranty or negligence in providing information; by sampling the communications and memos that go out of the office; or by using cameras to observe employee conduct.

other concerns, some tend to "puff" the savings that their systems offer.

- **Technological Imperatives.**—Monitoring measures many things that employers have always wanted to know. In addition, a manager is concerned with doing all that he or she can to increase efficiency and cut waste. Nor should one rule out an irrational, but common response to new technology: "if it can be done, it should be done." Because of this, the use of monitoring technologies may become an imperative or an accepted way of doing business.

Factors Limiting Increased Monitoring

Not all factors indicate a headlong drift toward more widespread and intensive monitoring. Indeed, many factors seem to suggest that monitoring, if taken to extremes, may actually impede some of the goals that it seeks to further (e.g., productivity). Such factors may include:

- **Employee Backlash, Morale, and Turnover.**—Past attempts to drive employees to ever-higher levels of production through close supervision, surveillance, abuse, and threats of discharge have met with great resistance among workers.[37] Employee sabotage and informal collusive "slowdowns," which tended to reduce production below the average, were often the result, even in nonunionized industries. During times of economic expansion, job turnover also increased. To the degree that automation is contributing to job upgrading (see below), turnover may become an increasingly expensive proposition, because of the time and money involved in training new employees.
- **Diminishing Returns.**—A monitoring system that emphasizes speed or volume, as many computer-based monitoring systems do, may often do so at the price of quality or accuracy. A computer-based monitoring system that counts keystrokes, for example, may engender a greater number of unintentional or intentional errors (e.g., holding one key to increase total number). According to a recent work on the subject, greater gains in productivity are often the result of a reorganized workflow and the integration of previously fragmented tasks.[38]
- **Job Deskilling or Upgrading.**—It is unclear whether office automation is stripping relatively skilled jobs of their discretionary and autonomous content (deskilling), or whether it in fact is taking the drudgery out of work, leaving the employee with a greater latitude for individual creativity (upgrading). Some studies have suggested that both deskilling and upgrading are occurring, sometimes within the same occupation.[39] To the degree that jobs are being upgraded by automation, work monitoring systems that require jobs to be routinized, and reducible to standardized units of production, may become less and less apropos of highly complex, nonstandardized work environments.[40]
- **Information Overload.**—Although electronic monitoring offers gains in efficiency over human observation, it very often requires that a human digest the information generated by the system and make managerial decisions based on that information. This in itself may require considerable investments of time and wages. The records generated by telephone call accounting systems, for example, can be quite voluminous, and often require a cadre of auditors to verify and interpret the results.[41]

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[37] See: A. Gouldner, *Patterns of Industrial Bureaucracy* (Glencoe, IL: Free Press, 1954).

[38] Paul Straussman, *Information Payoff* (New York, NY: Free Press, 1985).

[39] P. Attewell and J. Rule, "Computing and Organizations: What We Know and What We Don't Know," *Communications of the ACM*, December 1984, vol. 27, No. 12, pp. 1184-1192; R. Kling and W. Sacchi, "Computing as Social Action: The Social Dynamics of Computing in Complex Organizations," *Advances in Computers*, vol. 19, 1980.

[40] Paul Straussman, *Information Payoff* (New York, NY: Free Press, 1985).

[41] See ch. 3 for an example of an expense report generated by telephone call accounting.

[42] R. Edwards, "Individual Traits and Organizational Incentives: What Makes a 'Good' Worker," *Journal of Human Resources*, winter 1976.

- **Management Priorities.**—The kinds of information provided by electronic monitoring may not assist management in addressing the workplace inefficiencies that it perceives as most troublesome, and monitoring may frustrate the human relations goals that many firms see as a key to productivity. Among management's more pressing concerns are employee fraud and chronic absenteeism and tardiness;[42] conduct that requires no electronic monitoring to detect or deter. Moreover, management may have no interest in monitoring systems that degrade worker responsibility and morale, since commitment to the job is perceived as a vital element of employee productivity.[43]

Wild Cards: Automation and Artificial Intelligence

It is possible that present concerns over work monitoring may be rendered obsolete by machines whose functions are to substitute for precisely the type of job that is today the focus of monitoring. As mentioned in chapter 2, electronic monitoring is most often used in jobs that require relatively few skills, that are highly routinized, and that have more or less uniform patterns of input and output. This type of labor is gradually being substituted by automation. Data-entry work (whether numeric or textual in nature), for example, can be eliminated by:

- interorganizational transfer of data, directly from computer to computer;
- direct input of data by optical scanning technologies, and possibly by speech recognition technology; and
- capture of data at the point of origin, in a variety of ways ranging from bar code readers to consumer use of terminals, e.g., bank automated teller machines (ATMs).[44]

In conjunction with progress in natural languageprocessing and pattern recognition systems,[45] this trend toward automation of highly routine jobs may end up eliminating narrow, low-skill clerical positions altogether, replacing them with multi-activity skilled positions.[46] Highly complex jobs, requiring multifaceted decisionmaking, interpersonal skills, and "common sense" judgment, are unlikely to be as susceptible to electronic monitoring, since these jobs are not amenable to merely quantitative measures of performance.[47] Thus, it is possible that the issue of electronic work monitoring is merely a transient phase in the automation of office work. There are some indications, however, that data entry requirements are accelerating faster than the ability to automate them. So it may be quite some time before monitored jobs are automated out of existence.

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[43] R. Walton, "From Control to Commitment in the Workplace," *Harvard Business Review*, vol. 35, No. 2, 1985, pp. 76-84; and "The New Industrial Relations," *Business Week*, May 11, 1981. See also: *Business Week*, "The Hollow Corporation" special issue, Mar. 3, 1986; *Business Week*, "High Tech to the Rescue," June 16, 1986; National Academy of Science, *Towards a New Era in the U.S. Manufacturing* (Washington, DC: 1986); and *Human Resources Practices for Implementing Advanced Manufacturing Technology* (Washington, DC: 1986).

[44] From U.S. Congress, Office of Technology Assessment, *Automation of America's Offices*, OTA-CIT-287 (Washington, DC: U.S. Government Printing Office, December 1985), p. 47.

[45] U.S. Congress, Office of Technology Assessment, *Information Technology R&D: Critical Trends and Issues*, OTA-CIT-268 (Washington, DC: U.S. Government Printing Office, February 1985), see especially ch. 3, "Selected Case Studies (Artificial Intelligence).

[46] U.S. Congress, Office of Technology Assessment, *Automation of America's Offices*, OTA-CIT-287, p. 51. Of course, the low-skilled employee may be eliminated entirely. The consequences of automation for the job market are highly controversial, but it is unimportant for present purposes to enter the debate.

[47] This statement should be qualified by two caveats: any job performance can in theory be subjected to quantifiable, electronically monitorable criteria; and electronic monitoring of the future may be able to build in some sort of assessment of the qualitative features of job performance.

PART III: AN OVERVIEW OF APPLICABLE LAW

The Framework for the Legal Analysis

Part II suggested that concerns over the purpose of monitoring can be understood as objections based on notions of fairness; that the manner and method in which monitoring is implemented may involve issues of dignity, autonomy, and privacy; and that issues involving the effects of monitoring can be largely understood as concerns over health and stress. The following legal analysis uses this framework by applying more specific legal concepts to the purpose/manner and method/effect framework. Table 15 shows the relationship of this framework to applicable law.

Each of the major types of monitoring considered in this report—computer-based monitoring, telephone service observation, and telephone call accounting—will, to the extent that they raise unique legal issues, be discussed separately. Otherwise, the analysis that follows is cumulative; what is said of computer-based monitoring, for example, applies equally to telephone customer service observation and telephone call accounting, unless specifically mentioned in the text.

Before proceeding with the analysis, it is necessary to discuss two issues common to all three types of work monitoring: the concept of employment-at-will and the differing legal status of private and public sector employees.

The Concept of Employment-at-will

Under the common law tradition in the United States, the relationship between employer and employee has been one of "employment-at-will." Employment-at-will simply means that, in the absence of a specific agreement to the contrary, an employer has an absolute right to discharge an employee for any reason, and the employee has a correlative right to resign for any reason.[48] Although subject to considerable erosion through a variety of judicial and statutory exceptions and qualifications (discussed below where relevant),[49] the employment-at-will doctrine is still law in all 50 States.

Table 15.—A Framework for Addressing Electronic Work Monitoring

	Concern	Criteria	Example of applicable law
Purpose of monitoring	Fairness	Relevance Completeness Targeting	National Labor Relations Act; Civil Rights Act; Merit System Principles (as administered in EEO, OSHA, ERISA, EPA, etc.[a]); State Law on Privacy; Constitutional Law[a]
Manner and method of monitoring	Autonomy Dignity Privacy	Intensiveness Intrusiveness Visibility Type Leakiness Permanence	State Law on Wrongful Discharge; State Law on Privacy; PCIE Guidelines; Title III of Omnibus Crime Control and Safe Streets Act; Electronic Communications Privacy Act; National Labor Relations Act; Privacy Act of 1974[a]
Effect of monitoring	Health Stress	Frequency Continuousness Regularity Control	Worker's Compensation Statutes on Stress-Causing Labor

[a]Applies only to Federal employees.

SOURCE: Office of Technology Assessment, 1987.

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[48] S. Williston, Contracts §1017 (1967); see e.g., *Pearson v. Youngstown Sheet & Tube Co.*, 332 F.2d 439 (7th Cir.), *cert denied*, 379 U.S. 914 (1964). The terminability at will doctrine can be modified by a contractual agreement to retain the employee for a specified period of time require that the discharge of an employeee be based on a breach of that employee's obligations under the terms of his or her contract of employment.

[49] The claim of wrongful discharge, for example, has been accepted in a majority of States. "To date, the common law of three-fifths of the states has recognized, albeit to markedly varying extents, a cause of action for wrongful discharge in one form or another." Kenneth T. Lopatkay, "The Emerging Law of Wrong Discharge—A Quadrennial Assessment of the Labor Law Issue of the 80's," 40 *Business Law* 445 (1984), and see: William L. Mauk, "Wrongful Discharge: The Erosion of 100 Years of Employer Privilege," 21 *Idaho Law Review* 201 (1985).

The significance of the doctrine of employment-at-will for electronic work monitoring lies in its practical effect on the legal or economic pressure that an individual employee can bring to bear against the employer. Unless the contract of employment includes either substantive prohibitions, such as work environment clauses that can be construed to extend to work monitoring, or procedural requirements, such as binding arbitration agreements, an employee who objects to being monitored has the options of accepting the practice, protesting the practice to the employer and facing possible dismissal, or leaving the job voluntarily. This is particularly true of Federal employees, who, though they are represented by the American Federation of Government Employees (AFGE), are forbidden by law to negotiate performance standards which are at the heart of many disputes over electronic monitoring.[50]

The Legal Status of Public v. Private Sector Employees

The legal rights of an employee with respect to electronic monitoring depend critically on whether the employer is a privately owned and operated firm or an agency or subdivision of the local, State, or Federal Government. As a general rule, an employee has no constitutional rights against private individuals, including private employers.[51] Therefore, even if some forms of monitoring can be said to infringe a constitutionally protected interest, that interest can only be vindicated if the employer is a local, State, or Federal Government, or if the employer is acting pursuant to or under authority of a statute or ordinance.[52] Furthermore, the Privacy Act of 1974, which may be relevant insofar as electronic monitoring often generates a system of records, applies only to records kept by the Federal Government. It is therefore significant primarily to Federal Government employees.[53]

Notwithstanding this crucial distinction between private and public sector employers, there are a number of State and Federal statutes that may be relevant to considerations of the purpose, the manner and method, and the effect of monitoring by *both* private and public sector employers. The public/private distinction is therefore considered below only where relevant.

Purpose

Computer-Based Monitoring

Computer-based monitoring is the computerized collection, storage, analysis, and reporting of information about certain employee work activities. Within this broad definition, the chapter focuses on the use of computer-based monitoring to obtain data about employees directly through their productive use of computer and telecommunications equipment. In all cases documented by OTA, computer-based monitoring is used by both public and private sector employers for entirely legal purposes. As a rule, an employer is not liable for endeavoring to further its legitimate business interests, such as enhancing productivity and quality. Nor is an employer liable for protecting its property, or for investigating misconduct or crime.[54]

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[50] 5 U.S.C. §43, The Federal Labor Relations Statute.

[51] This concept is known as "State action." It is a basic principle of constitutional law, and provides that the rights secured to individuals by the 14th Amendment to the Constitution proscribe only certain actions by the state, state agencies or subdivisions, or individuals acting under color of State law, and do not limit actions between private individuals or private entities. See e.g., *Flagg Bros., Inc. v. Brooks*, 436 U.S. 149 (1978). There are certain narrow exceptions to this rule, as where a company assumes all the functions of a municipality, *Marsh v. Alabama*, 326 U.S. 501 (1946), or where there is substantial State involvement with a private entity, e.g., *Burton v. Wilmington Parking Authority*, 365 U.S. 715 (1961). Some have argued that the actions of large private organizations that wield great economic power over individuals should be considered State action. See, e.g., Berle, "Constitutional Limitations on Corporate Activity—Protection of Personal Rights Invasion Through Economic Power," 100 *University of Pennsylvania Law Review* 933 (1952).

[52] Even in the latter case, the breadth of State action may in fact be very narrow. See, e.g., *Moose Lodge v. Irvis*, 407 U.S. 163 (1972) (State liquor license for segregated dining room was insufficient State involvement).

[53] A provision that would have made the Privacy Act, 2 U.S.C. §552a (1976), applicable to the private sector was present in the original Senate version of the Act, S 3418, 93d Cong., 2d sess. §201(a), but was not adopted. The Privacy Act is, however, applicable to government contractors. 5 U.S.C. §552a(m).

Computer-based monitoring for purposes of advancing or protecting commercial interests and overseeing actions of employees is not merely prudent business practice—it may be a positive legal requirement.[55] In many instances, an employer is held vicariously liable for the torts or crimes of its employees, based in part on the theory that it is in control of and responsible for many of the actions of its employees while in the scope of their employment.[56] Furthermore, an employer, as a seller or even gratuitous supplier, may be liable for the quality of the goods, services, and perhaps even the information produced by its employees.[57] And, monitoring the flow of trade secret information out of a business concern may be necessary if an employer is to preserve its rights under trade secrets law.[58]

When used for certain purposes, however, computer-based monitoring may become the instrument of illegal ends. It is conceivable, for instance, that monitoring could be used to frustrate the rights of employees to organize, by being used as "punishment" for individuals seeking to organize.[59] OTA found no evidence that monitoring is actually being used in this way.[60]

It is also conceivable that monitoring might be used to discriminate against a class of employees, by placing stricter scrutiny and standards of job performance on certain groups. As mentioned in chapter 2, the highly specific information that monitoring generates often requires a considerable amount of interpretation, leaving great leeway for (intentional or unintentional) misinterpretation in the guise of "objective," quantitative evidence. OTA found no case where monitoring was intentionally used for this purpose, but that does not preclude such a possibility.[61] It is important to point out, however, that the vast majority of employees whose work is monitored by computer are

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[54] Based on one survey of the top three reasons for auditing the use of intelligent desktop terminals were:

- To prevent abuse of company PC resources for personal purposes.
- To prevent confidentiality/security breaches.
- To prevent violation of legal/regulatory duties in the use of client or employee data.

From Alan Westin, and The Educational Fund for Individual Rights, *Privacy and Quality of Work Life Issues in Employee Monitoring*, contractor paper prepared for OTA, May 1986.

[55] For example, a representative of American Express Corp., Inc., informed OTA that American Express is required by the Fair Credit Reporting Act to stop dunning a card member who writes in to say that he or she is having a dispute with a service establishment. Because the letters are computer generated, the only way that American Express can know it is in compliance is through its monitoring system, which aggregates all such transactions and reports on when they are made.

[56] See, e.g., *Prosser on Torts*, §69 (1971).

[57] The Uniform Commercial Code, adopted in 49 States, imposes on the seller of goods three different kinds of warranties. U.C.C. 2-313-315 Providers of services, such as insurers, may be liable for breach of either express or implied conditions of the contract. Information providers, such as database companies and weather forecasters, may be liable on several theories, such as strict liability, negligence, warranty, or defamation. See: e.g., *Aetna Casualty & Surety Co. v. Jeppesen & Co.*, 767 F.2d 1288 (9the Cir. 1985); and *Dunn & Bradstreet v. Greenmoss Builders, Inc.*, 105 S.Ct. 2939 (1985).

[58] A trade secret is a form of intellectual property that covers any confidential formula, pattern, device, or compilation of information used in a business, which gives that business an opportunity to obtain an advantage over competitors who do not know or use the secret. One of the factors for determining whether a business' secret is a trade secret is "the extent of measures taken by (it) to guard the secrecy of the information." *Restatement of Torts*, §757, comment B.

[59] Such rights are protected, for example, by the National Labor Relations Act, 29 U.S.C. §151 et seq., which secures to employees "the right to self-organization, to form, join, or assist labor organizations . . ." Id., at §157. The use of monitoring to impose changes in working conditions—e.g., by accelerating machine pacing—may be illegal if done for the purpose of reprisal against employee organizational activity. 29 U.S.C. §158 (a) (3); See, e.g., *N.L.R.B. v. Sanitary Bag and Burlap Co.*, 406 F.2d 750 (3rd Cir. 1969) It is also possible that PC use could be monitored to detect union communications by searching or auditing PC-user disks or files, although there is no indication that this activity is widespread today. Monitoring for this purpose, however, would probably *not* violate labor laws, since employers may observe the activities of employees on its property during working time. *Stone & Webster Engineering Corp. v. N.L.R.B.*, 536 F.2d 461 (1st Cir. 1976); *N.L.R.B. v. R.C. Mahon Co.*, 269 F.2d 44 (6the Cir. 1959).

[60] One source told OTA that one practice in monitoring computer files is to check for human error. Under this circumstance, some privacy questions may raised, despite the legitimate purposes of the monitoring.

[61] For example, the veracity of computer monitoring records was the subject of an arbitration dispute between The State of Oregon Employement Division and the Oregon State Public Employees Union (affiliated with the SEIU), on behalf of one of its members. The employee was fired from her job as word processing specialist for allegedly tampering with her and others' production statistics generated by a Wang "Machine Statistics System." The arbitrator found the statistics generated by the computer system reliable, albeit circumstantial, evidence that the employee had tampered with the system, and let the State's decision to terminate the employee stand. The union

(footnote continued on next page)

female, raising questions about the existence of de facto discrimination in working conditions.[62]

Finally, monitoring could be used as a method of detecting, preventing or retaliating against whistleblowers. This might be accomplished by restricting access to certain computer files for the purpose of preventing damaging information from being revealed, by tracking the types of files accessed by certain employees in order to ascertain the source of "leaks," or by imposing more onerous demands on certain employees for revealing evidence of waste, fraud, or abuse.[63] OTA again found no evidence that monitoring is being used for such purposes.

The number of illicit purposes to which monitoring can be put is limited only by the imagination, yet monitoring seems no more or less likely to lend itself to illegal retaliation than any other form of office technology (the paper copier or punch clock, for instance). However, the employee may often know that his or her computer files or phone calls are being "observed" by the monitoring system, and this knowledge may in itself act as a "chilling" device to would-be whistleblowers or union organizers. In a case example submitted to OTA by the AFL-CIO, the chilling effect of video observation was noted:

> . . . employer installed and focused TV monitoring equipment inside the plant on every work station and worker after organizing effort began. Monitors were not available for all to see, but viewed only by management in management's office. Employer said monitoring was for safety reasons and would lower Worker Compensation insurance rates. In fact, no one could determine how that could be. During the height of organizing, two workers who left their work stations to go to restroom were suspended for leaving their work station, without permission. Monitoring had chilling effect on workers attempting to organize for purposes of collective bargaining. Of the 100 workers in the unit, 89 signed authorization cards calling for a recognition election. But when the final vote came, the union was 12 votes shy of a majority. . ." There was an unspoken fear that Big Brother would catch them talking for or working for that union.[64]

Even if the truth of this use of monitoring for alleged purposes of union-busting are not

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disputes the arbitrator's findings, and suggests that the employee's "work station was frequently used by other employees, particularly her supervisor with whom she had a bad working relationship." From a "case study" submitted to OTA by the Service Employees International Union, and Westin, "Privacy and Quality-of-Worklife Issues in Employee Monitoring," OTA Contract Report, December 1986. See also, *The Wall Street Journal*, June 6, 1985. The union thus suggests the possibility that the employee could have been "framed." Regardless of whether the employee in this case was in fact culpable for the alleged tampering, it is clear that monitoring systems are capable of being used for discriminatory or retaliatory reasons: the objective, mechanically produced measurements of productivity can be "rigged," and undue trust can be placed in machine printouts.

[62] See Title VII, Civil Rights Act of 1964, 42 U.S.C. 2000c (a)(1). The de facto feminization of monitoring may give rise to suits under the Civil Rights Act, since intent to discriminate is not a prerequisite to an action under Title VII.

[63] Federal employees have been protected by statute against reprisal for disclosing waste, fraud, or abuse in the Federal Government since 1979. As part of "merit system principles," all employees of the executive branch of government, the Administrative Office of the U.S. Courts, and the Government Printing Office:

> . . . should be protected against reprisal for the lawful disclosure of information which the employees reasonably believe evidences—
>
> (A) a violation of any law, rule, or regulation, or
>
> (B) mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety
>
> 5 U.S.C. §2301(b)(9)

Additional protection may be available under anti-reprisal clauses of various substantive employee protection or public protection laws, such as EEO, OSHA, ERISA, EPA, and so on. **Other public employees** are protected under First Amendment principles, as articulated in *Pickering v. Board of Education*, 391 U.S. 563 (1968) ("the interests of the [employee], as a citizen, in commenting upon matters of public concern [are to be weighed against] the interest of the State, as an employer, in promoting the efficiency of the public services it performs through its employees." Id. at 568. See also: *Mt. Healthy City School District Board of Education v. Doyle*, 429 U.S. 274 (1977) (protected whistleblowing must be "a matter of public concern" and play a "substantial part" in decision to fire); and *Connick v. Myers*, 451 U.S. 138 (1983) (whether dissent is a matter of public concern is determined by content, form, and context of communication). In addition, 21 States have enacted whistleblowing statutes. "Beyond Unions," *Business Week*, July 8, 1985, p. 73.

Employees in the private sector may be protected under exceptions to the employment-at-will doctrine. See footnote 49.

[64] From AFL-CIO Case Examples, submitted to OTA. The technology allegedly used to monitor these employers was the video camera—a technology not considered in this report. However, software for computer-based work monitoring could be used to accomplish much the same purpose as alleged in this case study, by recording the time away from a station, by monitoring internal electronic mail and employee-generated documents, or by determining who was logged onto a particular work station.

born out, it nevertheless illustrates the heightened potential of monitoring used to deter the efforts of whistleblowers or union organizers. This potential is also explored below in the context of telephone call accounting.

Telephone Service Observation

Telephone service observation was described in chapter 3. It refers to the act of systematically intercepting the content of employee telephone calls by listening in on them. This is often done by a supervisor or quality control specialist to evaluate courtesy, accuracy, or compliance with company guidelines. It is a common practice in a host of businesses which sell products or service customers over the telephone. As mentioned in chapter 2, service observation is becoming integrated with various forms of computer-based monitoring, the legal implications of which were considered above. This section will consider service observation in isolation from other monitoring techniques.

The use of service observation for illicit purposes—e.g., to discourage or listen in on employee organizational activities, to discriminate against certain classes of employees, or to detect and punish whistleblowers—is subject to much the same legal analysis as computer-based monitoring, and presents few unique problems for the law.[65] Since service observation is by nature a method of intercepting the *content* of employee communications, legal rights to privacy under State tort law may be implicated, and while the employer often enjoys a qualified privilege to listen in on employee phone calls, that privilege may be vitiated by improper motive.[66] Otherwise, the employer's purpose for monitoring is not a consideration separate and apart from the manner and method in which the service observation is conducted.

Telephone Call Accounting

Chapter 3 discusses telephone call accounting in detail. Telephone call accounting systems are devices which can be attached to either the central office switch of the local telephone network or, increasingly, to the private branch exchanges (PBXs) on the customers' premises. Call-accounting systems generate detailed raw data on telephone usage; incoming and outgoing call numbers, total number of calls made, total time on the line, etc (they do not provide information on the content of the telephone call). This raw information can be processed by computer to provide summary reports of any type of telephone activity that the employer feels is relevant or useful.

Call accounting is often used for purposes that many might consider legitimate business functions, such as allocating costs between various accounts in a business, billing customers or clients for particular services, and keeping track of abuse or waste of local or long-distance telephone services. The recently enacted Communications Privacy Act of 1986 explicitly recognizes the need for call accounting in the course of providing communication services.[67]

The extent of personal phone use in the Federal Government was examined in a call-accounting audit conducted by the President's Council on Integrity and Efficiency (PCIE) in conjunction with the General Services Administration (GSA) and Office of Management and Budget (OMB). That audit reported in the fall of 1986 that on the average about 33 percent of long-distance calls made on the Federal Telephone System (FTS) were "unofficial," that is, made for personal reasons.

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[65] A very important qualification to this statement is Title III of the Communications Act of 1934, which prohibits "eavesdropping" per se, without regard to the intent of the person doing the eavesdropping, with certain crucial exceptions. Title III is considered more fully below under the **manner and method** analysis.

[66] [Defenses to common law claims of invasion of privacy include the defense of "privilege"] The qualified privilege of the defendant to protect or further his own legitimate interest has appeared in a few cases, *as where a telephone company has been permitted to monitor calls* . . . ; citing: *Schmulker* v. *Ohio Bell Telephone. Co.*, 116 N.E. 2d 819 (1953) (time and motion studies of employees); *People* v. *Applebaum*, 97 N.Y.S. 2d 807 (1950) (tapping own telephone to protect own interests); *Wheeler* v. *Sorenson Mfg.*, 415 S.W.2d 582 (1967) (publication of wages and deductions of employees to combat union drive); and *City of University Heights* v. *Conley*, 252 N.E.2d 198 (1969) (spying on suspected thief). *Prosser on Torts*, §117

[67] The Electronic Communications Privacy Act of 1986, Public Law No. 99-508, 99th Cong., 2d sess., Oct. 21, 1986 amends portions of the criminal code (Title 18) to accommodate digital communications, computer networks, cellular telecommunications, and other advances in communications. Its import for telephone call accounting and service observation is discussed below where relevant.

Concerns were raised in Congress over the implications of the PCIE audit for privacy and whistleblowing. Problems might also exist, particularly in the private sector, if call accounting were be used to frustrate union organizing efforts. As previously discussed, however, legal protections exist to address concerns over employee/union rights, and whistleblowers. Moreover, PCIE has adopted guidelines to address some of the concerns over the privacy and first amendment implications of the program.[68] Among the protections are: a "conservative" approach to classifying calls as "unofficial," prohibitions on invading the privacy of the persons called from the agency, categorization of "calls possibly made to news media, congressional offices, public interest groups, and employee unions" as "official,"[69] and a prohibition on using data to single out individuals or to conduct investigations.[70] It remains to be seen, however, whether and how the PCIE initiative will be continued and become part of the regular internal auditing Federal agencies. One department indicated that in spite of its pilot study results—indicating significant unofficial use of the department's telephone system—the agency had no plans for further efforts to reduce these misuses, because of concerns over privacy implications.[71] If the audit does become a permanent part in intraagency audits, questions arise over whether protective guidelines will also become permanent, and if so, how such guidelines will be enforceable. If, for example, a Federal employer were to discipline or withhold promotion or information from an employee based on that employee's contacts with the press, the employee may find it difficult to prove that the employer's motivations for doing so were the result of information obtained through telephone call accounting.

Although the PCIE study guidelines forbid listening to or recording conversations (as does Title III, discussed below), information on telephone transactions can yield a great deal of inferential knowledge about an employee's personal and life outside of work. Knowing that an employee contacted a particular newspaper one day before a damaging article is printed is sufficient to infer the content of the conversation, regardless of how that call is classified or whether it is subject to detailed investigation. Moreover, records of the audit which connect names and numbers, while protected by the Privacy Act, may nevertheless be subject to disclosure through the Freedom of Information Act.[72]

Yet another difficulty with the PCIE study guidelines concerns *enforcement and discipline*. At present the guidelines contemplate disciplinary action, such as removal, suspension, demotion, or reprimand only in cases of "extreme" cases of FTS abuse. The difficulty here is with selective enforcement and uniformity of treatment. The PCIE guidelines offer no guidance on what constitutes "extreme" abuse, and no mention is made of who within each executive agency will be responsible for enforcement. This leaves considerable discretion to agencies' Inspectors General in determining who will be disciplined and under what circumstances. It opens the door to claims of differential treatment between low-ranking clerical staff and high-level government executives. Since the scope of job responsibility is often fairly narrow for low-level employees (e.g., claims processing at the Social Security

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[68] General Services Administration, Office of the Inspector General, Office of Audits, "Guide for the PCIE Review of Federal Telecommunications System (FTS) Utilization," part II, see especially app. XIII, pp. 65-74, July 3, 1985.

[69] Ibid., p. 29. Section IX of the "Guide" states that research activities concerning calls to these destinations should be terminated, that the information cannot be released to management, and that the information cannot be used against the person who made the calls.

[70] Ibid., p. 30. The Guide does recommend, however, that "serious or egregious" cases of misuse should be referred to the agencies investigative organization for possible further action.

[71] OTA staff telephone interview with Department of Energy Office of Inspector General representative, fall 1986.

[72] See Title 5 U.S.C. §552, infra. See also Notice of Proposed Privacy Act Guidance for Call Detail Systems (OMB), 51 *Federal Register* 19982, 19984 (Friday, May 23, 1986), which discusses disclosure in the context of a permanent FTS telephone call-accounting system.

Administration), discriminating between "official" and "unofficial" calls may be relatively easy. But for high-ranking personnel, whose communications are more likely to be a mix of "business" and "pleasure,"[73] such determinations may not be so easy. In other words, the informalities and ambiguities of the PCIE guidelines may give greater latitude to high-ranking employees than lower level employees. Under the proper circumstances, this may give rise to a claim of denial of equal protection of the laws under the 14th amendment.

Finally, there is a difficulty of *administering* the telephone call-accounting audit, particularly if it is implemented on a permanent basis. Although OMB has, under the PCIE guidelines, drawn up fairly extensive analyses of Privacy Act implications concerning employee privacy and the disposition of records, the question remains: who will be responsible for overseeing the agencies in the conduct of their audits to ensure that the guidelines are followed? A recent OTA report[74] concluded that OMB is not effectively monitoring such basic areas as: the quality of Privacy Act records: the protection of Privacy Act records in systems currently or potentially accessible by microcomputers; the cost-effectiveness of recordkeeping; and the level of agency resources devoted to Privacy Act limitations.

Such practical difficulties notwithstanding, there appears to be no dearth of legal protection for activities of Federal employees that the law recognizes as legitimate and responsible. However, the use of telephone call accounting by private sector employers for illicit purposes is not so clearly proscribed by law. In fact, the only recourse of the private sector employee against the employer for using call accounting to track whistleblowing activities is the nascent legal right against "wrongful discharge."[75] Because of the principle of State action (see above), the private sector employee can claim no first amendment right to speak to the public or the press. Of course, statutes governing communications between employees and labor organizations, discussed above, apply with equal force to telephone call accounting. It should be noted that, unless the employer consents to the use of its telephones for labor organizational purposes, the employee probably does not have rights under statute to protest the use of telephone call accounting to track and squelch union communications.[76]

Manner and Method

Computer-Based Monitoring

The use of computer-based monitoring as a means for furthering the legitimate employer interests raises few, if any, legal issues. The first hurdle that an attorney challenging the practice itself must meet is to identify a "cause of action"—a legally recognized right that forms the basis for a lawsuit. The only right remotely relevant to monitoring is the right of privacy.[77]

Privacy is a broad value, representing concerns about autonomy, individuality, personal space, solitude, intimacy, anonymity, and a host of related concerns.[78] Since monitoring is one method of obtaining information about and control over an employee's activities, some of these concerns may be relevant.

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[73] For example, is a long-distance call to set up a "business lunch" with a good friend an "official" or "unofficial" call?

[74] U.S. Congress, Office of Technology Assessment, *Federal Goverment Information Technology: Electronic Record Systems and Individual Privacy*, OTA-CIT-296 (Washington, DC: U.S. Government Printing Office, June 1986).

[75] Retaliatory discharge for whistleblowing activities may be counter to public policy, and may thus constitute a wrongful discharge. See, e.g., *Monge* v. *Beebe Rubber Co*, 114 N.H. 130, 316 A.2d 549. 62 A.L.R.3d 264, 25 EPD P 31,643; and R. Murg and J. Sharman, "Employment at Will: Do Exceptions Overwhelm the Rule?" 28 *Boston College Law Review* 329 (1982). Moreover, employers may be held to their own internal statements of policy concerning matters such as privacy and treatment of employees with respect to monitoring. See, e.g., *Woolley* v. *Hoffman-LaRoche, Inc.*, 99 NJ 284, 491 A.2d 1257 (1985), which held that the employer's official statement of policy for its employees created a contract of employment for an indefinite period.

[76] Under the National Labor Relations Act, 29 U.S.C. §158, for example, it is not unlawful for an employer to observe employee activities at the worksight during working hours to see if union activity is being conducted on company time. *N.L.R.B.* v. *R.C. Mahon Co.* 269 F.2d 44 (6th Cir. 1959).

[77] Various theories under tort law, such as assault, intentional infliction of emotional distress, defamation, outrage, and mayhem were considered, but lack sufficient connection to the types of activities involved in computer-based monitoring.

[78] See U.S. Congress, Office of Technology Assessment, *Federal Government Information Technology: Electronic Record Systems and Individual Privacy*, OTA-CIT-296 (Washington, DC: U.S. Government Printing Office, June 1986).

Although monitoring may affect culturally held values, there are serious problems in attempting to stretch the *legally enforceable* values regarding privacy, whether based on common law, statute, or the Constitution, to cover the types of monitoring considered in this report.[79] Although 34 States have adopted laws regarding employer use of polygraph machines, and 21 have laws addressing the privacy of employee records,[80] none have so far adopted legislation restricting monitoring, as such. One State, Massachusetts, has attempted to enact legislation that might prohibit computer-based monitoring per se, but the legislation was found to violate the due process and equal protection clauses of the U.S. Constitution.[81]

Furthermore, some State courts may hold employers to internal statements of policy regarding employee privacy, and may award damages for "unjust termination" of employees who seek to withhold information under these policy statements.[82] This approach has not been widely accepted in the courts, and the corporate policy statements seldom address monitoring explicitly.

There are several situations in which computer-based monitoring may implicate certain legal rights. The first is where the monitoring, which ordinarily reveals quantitative information about the amount of work done and the time spent doing it, reveals "personal" information as a byproduct. For example, if the only discretionary breaks allowed a monitored worker are for trips to the bathroom, the computer may allow an employer to glean this information by the frequency and duration that the employee is logged off the terminal.[83] In this situation, a breach of employee privacy is arguably present.[84] Another situation concerns the monitoring of personal computer use, and the auditing or editing of employee computer files. If the employer permits an employee to use computer files to store personal information, or electronic mail capabilities for personal messages, a breach of privacy may be found under a number of theories if the employer subsequently examines or reveals the contents of the files or mail.[85] Finally, to the extent that the transactions monitored by computer become part of the employee's record of employment, compliance with procedures set out in the Privacy Act of 1974 (governing only Federal employees) or several State privacy statutes may be necessary.

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[79] The most widely accepted privacy framework under **tort law** is that offered by Prosser. See "Privacy," 48 *California Law Review*, 383 (1980). Each of the four distinct torts—intrusion, disclosure, false light, and appropriation—require a physical invasion of the person or his/her property or personality and publication of the information gained by the invasion. Neither of these criteria is applicable to monitoring considered in this report. Moreover, consent to monitoring, either explicit or as a implied condition of the employment contract, would probably vitiate whatever claims an employee might have. Privacy under **statutory law**, at both the Federal and State level, concerns principally privacy of employee records, and while not relevant to the act of monitoring itself, may be relevant to records generated and kept by the monitoring system. This is considered below where relevant. Privacy under the **U.S. Constitution** has two main branches; rights under the 14th amendment, designed to protect family relationships, *Roe* v. *Wade*, 410 U.S. 113 (1973), *Griswold* v. *Connecticut*, 381 U.S. 479 (1965); and rights under the Fourth Amendment, designed to limit unreasonable searches and seizures. *Katz* v. *United States*, 389 U.S. 347 (1967), and progeny. Both of these branches require state action. Even supposing that monitoring might be considered a "search" under the fourth amendment, it is unlikely that an employee would be found to have a "legitimate expectation of privacy" in his or her performance at a given task. *Id.*

[80] These figures are from *Compilation of State and Federal Privacy Laws* (1984-85 ed.), Privacy Journal (Washington, DC: Privacy Journal), and January, 1986 supp., but see: *Congressional Research Reports*, Mar. 21, 1986, which reports that 22 States have adopted laws regarding employer use of polygraph machines, and that 10 have adopted laws addressing employee access to records.

[81] The legislation prohibited "the use of any monitoring device, without the express consent of the employee, by means of which the surveillance of employees might be effectuated." The term "monitoring device" included "any device, electronic, mechanical, visual, or photographic" by which "appearance, actions, or speech" could be monitored. cite. *Re: Opinion of Justices*, 356 Mass 756, 250 N.E.2d 448 ( ).

[82] *Op cit.*, *Woolley* v. *Hoffman-LaRoche*, 99 NJ 284, 491 A.2d 1257 (1985).

[83] See: Karen Nussbaum and Virginia DuRivage, "Computer Monitoring: Mismanagement by Remote Control," 56 *Business and Society Review* 16 (winter 1986); and Nine to Five: The National Association of Working Women, *Computer Monitoring and Other Dirty Tricks*, April 1986.

[84] The tort of **intrusion** may be applicable, if such monitoring amounts to an invasion of the employee's solitude or seclusion, even if there is not physical intrusion. Prosser on Torts, p. 807. If the private activity is publicized, there may also be a tort for **public disclosure of private facts**.

[85] For public sector employees, an action may arise directly under the Constitution. For private sector employees, a tort action may lie. The Electronic Communications Privacy Act of 1986 is ambiguous as to whether an employer might access the contents of its employees' computer files. The prohibitions of the Act speak to an "electronic communication while it is in electronic storage." 18 U.S.C. §2701(a) (as amended). While perhaps not intended as a communication when written, all files in a personal computer are potentially communicable. Further, the Act's prohibitions do not apply to "the person or entity providing a wire or electronic communications service," or to

Telephone Service Observation

Unlike computer-based monitoring, which primarily raises serious legal issues only when it is used to promote ends that are illegitimate, the legal difficulties with telephone service observation lie primarily in the manner in which it is carried out.

The principle law governing service observation is still Title III of the Omnibus Crime Control and Safe Streets Act of 1968, subject to the amendments involved in The Electronic Communications Privacy Act of 1986.[86] Title III forbids the interception of the contents of telephone calls by government or private persons, except by judicial authorization.[87] This blanket prohibition on "wiretapping," however, is subject to two exemptions that permit telephone service observation—the consent and business extension exemptions.[88] Both exemptions have been construed narrowly by courts. Consent cannot be implied from the employee's knowledge of a capability for monitoring,[89] but must instead be based on a knowledge (or imputation of knowledge) that certain types of phones or phone conversations will be listened to.[90] Similarly, the business extension exemption applies only to the interception of particular calls as a part of the enterprise's ordinary course of business,[91] and even at that, one court has held that personal calls may be intercepted only to determine their nature, but never their content.[92]

Title III and the Electronic Communications Act of 1986 appear to be the exclusive, albeit extensive, legal framework for issues that may emerge from telephone service observation.

Other legal theories, such as the common law right of privacy and (for governmental employees) the fourth amendment's prohibition on unreasonable searches and seizures, while possibly forming the basis for a legal action, are unproven in the context of service observation. "A recent case held that, although public employees are protected by the fourth amendment, their expectation of privacy must be balanced against the government's need for supervision, control, and efficient operation of the workplace.[93] Moreover, the government is not held to a "probable cause" standard; instead, its actions are assessed under a "reasonableness under the circumstances" standard. Title III applied only to aural communications, but The Electronic Communications Privacy Act of 1986 extends the coverage of Title 18 to address analogous concerns present in the service observation of the content of data communications.[94]

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a "user of that service with respect to a communication of or intended for that user." 18 U.S.C. §2701(b) (as amended).

[86] Title III of the Omnibus Crime Control and Safe Streets Act, 18 U.S.C. §§ 2510-2520 (1976). Public Law No. 90-351, § 802, 82 Stat. 212, as amended by The Electronic Communications Privacy Act of 1986, Public Law No. 99-508, 99th Cong. 2d sess., Oct. 21, 1986.

[87] The relevant portion reads:

Except as otherwise specifically provided in this chapter any person who—

> (b) willfully uses, endeavors to use, or procures any other person to use of endeavor to use any electronic, mechanical, or other device to intercept any oral communication. . . .
>
> . . . shall be fined not more than $10,000 or imprisoned not more than five years, or both.
>
> 18 U.S.C. §2511(1)(b).

The statute also provides for a civil remedy and statutory damages. 18 U.S.C. §2520.

[88] Section 2511(2)(d) of the law permits interception "where one of the parties to the communication has given prior consent to such interception," and Section 2511(1)(b) excludes from coverage "any telephone or telegraph instrument, equipment or facility, or any component thereof. . . .being used by the subscriber or user in the ordinary course of its business; . . ." In addition, communications common carriers may "intercept, disclose, or use (an employee's telephone conversations) in the normal course of his employment while engaged in any activity which is a necessary incident to the rendition of his service or to the protection of the rights or property of the carrier of such communication . . ." 18 U.S.C. §2511(2)(a)(i).

[89] *Watkins* v. *L.M. Berry & Co.*, 704 F.2d 577 (11th Cir. 1983); *Campiti* v. *Walonis*, 611 F.2d 387 (1st Cir. 1979); *Crooker* v. *U.S. Department of Justice*, 497 F.Supp. 500 (D.Conn. 1980).

[90] *Watkins* v. *L.M. Berry*, *supra*; *Jandik* v. *Village of Brookfield*, 520 F.Supp. 815 (N.D. Ill. 1981).

[91] *Watkins* v. *L.M. Berry & Co.*, *supra*; citing *Briggs* v. *American Air Filter Co.*, 630 F.2d 414 (5th Cir. 1980).

[92] *Watkins* v. *L.M. Berry & Co.*, *supra* at 583. In essence, the court held that, once the personal nature of the call is known, the employer must hang up.

[93] *O'Connor* v. *Ortega*, 107 S.Ct. 1492, 55 USLW 4405 (1987).

[94] Title III convered only oral communications, 18 U.S.C. §2510., *cf. U.S.* v. *New York Telephone Co.*, 434 U.S. 159 (1977) holding that a communication under Title III must be capable of being overheard.

Telephone Call Accounting

Many of the legal issues surrounding the use of telephone call accounting center on the incidental information generated by a call-accounting system. In other words, although the employer may not purposely set out to infringe employee rights, many of the by-products of call-accounting systems may in fact threaten employee privacy. In the act of tracking recipients of calls originating from certain phone numbers, employers must, of necessity, obtain information on the identity of the persons called, and the nature of the call (business or nonbusiness). Depending on how the audit is conducted, and how closely focused on individuals it is, a "picture" of extra-employment activity may be obtained merely from the identity of the destination phone numbers, even if the intent of the audit is to identify nonbusiness-related calls.[95] Once the information is collected, it may be intentionally or accidentally disclosed to people whom the employee would prefer remain unaware. Although a call-accounting audit may disclose misuse, such misuse may not be the fault of the employee (especially when others have access to the employee's phone)—a claim that may be hard to prove.

Federal employees are the most protected segment of the labor force. If the records generated by the telephone call-accounting system form part of a "system of records" personally identifiable to particular individuals, then, under the Privacy Act of 1974, the Federal employee is subject to a number of procedural safeguards concerning notice that such records are being collected, the subsequent use to which they can be put, the right of the employee to correct or amend the records, the necessity, and the acquisition for lawful purposes of those records.[96]

For public employees in general, it is unlikely that a constitutional claim under the fourth amendment could successfully be brought against the practice of telephone call accounting—even against its surreptitious use by police in order to obtain evidence for a criminal indictment.[97] The Electronic Communications Privacy Act of 1986, while providing stronger protection than the fourth amendment by requiring a court order for the application of pen registers and trap and trace devices,[98] is applicable to telephone call accounting.[99] However, depending on how the information gleaned from call-accounting systems is used and whether it is disclosed, all employees may have rights under common law theories of privacy or defamation.

Effects

Aside from the abusive purposes and methods of electronic monitoring discussed above, the most salient legal issue presented by monitoring concern its health-related effects on particular workers. Other, less tangible, effects are sociological in nature, and concern the impact of monitoring on the overall climate of work in the United States.

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[95] Calls to collection agencies may reveal debt trouble; calls to counselor may reveal psychological or marital trouble; calls to employers in similar businesses may reveal an intent to change jobs; and calls to the news media may reveal the source of "leaks."

[96] 5 U.S.C. §552(a), *infra*.

[97] Pen registers, which are devices that attach to a telephone line to record dial pulses, may be used in law enforcement to obtain information on suspects without the need of a search warrant. *Smith* v. *Maryland*, 442 U.S. 735 (1980). By extension, the use of call-accounting systems (that achieve very much the same result—albeit, in a more detailed fashion), which often form an integral part of modern PBXs, would seem to raise no unique fourth amendment problems, especially when they are used on the employer's premises and it is known by employees that they exist (thus raising no "subjective expectation of privacy").

[98] 18 U.S.C. Ch. 206 "Pen Registers and Trap and Trace Devices."

[99] Title 18 has been amended so as to specifically exclude a "provider of electronic communication service to record the fact that a wire or electronic communication was initiated or completed *in order to protect* such provider, another provider furnishing service toward the completion of the wire or electronic communication, or *a user of that service, from fraudulent, unlawful, or abuse use of such service*;" 18 U.S.C. 2511(3)(h)(ii) (emphasis added).

Call-accounting software might arguably be a "pen register" for purposes of The Electronic Communications Privacy Act of 1986, since, like SMDR PBX equipment, it is defined as "a device which records or decodes electronic or other impulses which identify the numbers dialed or otherwise transmitted on the telephone line to which such devices is attached. . . ." However, SMDR equipment and software is excepted from the prohibitions of the act: "(pen register) does not include any device used by a provider or customer of a wire or electronic communication service *for billing, or recording as an incident to billing*, for communications services provided by such provider or any device used by a provider or customer of a wire communication service *for cost accounting or other like purposes in the ordinary course of its business* . . ." 18 U.S.C. §3126 (emphasis added).

The literature on stress and work monitoring is not broken down cleanly into the three categories of monitoring dealt with in this report. Computer-based monitoring, telephone service observation, and telephone call accounting may each entail widely different work environment factors (e.g., different organization factors, different physical relationships between the employee and the technology on which the employee is working, and different expectations). Thus, any particular findings on stress are likely to vary widely between types of work monitoring. Nevertheless, most of the legal analysis that follows will hold true so long as stress can be shown to be caused by or associated with the particular type of monitoring in question.

This section relies on the analysis developed in chapter 2 examining the evidence for computer monitoring as a cause of stress, and applies relevant law in light of this evidence. The principle conclusions of chapter 2 are: 1) that evidence that computer monitoring, per se, causes stress is suggestive, but not conclusive; and that 2) many other aspects of job design and work enviornment—e.g., computer pacing, heightened work pressure, routinized activities, variable workloads, lack of control over the task, lack of decision latitude, lack of peer and supervisory support, and fear of job loss—may also cause stress among VDT office workers. Research to date has not succeeded in separating the effects of computer monitoring from effects of these other workplace factors, insofar as stress is concerned.[100]

Many of those opposed to work monitoring focus on its health, and particularly stress-related, effects. Moreover, many of the "case studies" submitted to OTA by a variety of unions emphasize the deleterious effects that monitoring has on employees' health. The approach of this section will therefore be to take the assertion that monitoring causes stress and health-related problems as a given, and ask: how might present law address concerns over these effects of monitoring?

All State jurisdictions recognize stress as a compensable injury, either under their tort or Worker's Compensation laws.[101] However, "stress" is subject to a wide variation in definition in the way it is manifested, and the manner and context in which it is inflicted. Standards of proof for its existence, and the degree of injury necessary for compensation, are determinative of whether monitoring-induced stress (if it can be shown to exist) will rise to the level of a legally recognized claim.

Worker's Compensation, which was established in all 50 States to provide compensation on a "no-fault" basis for the loss of ability to earn wages, is a substitute for employer tort liability. Most Worker's Compensation statutes require that the injury be accidental, and that it arise out of or in the course of employment. Courts have read these requirements expansively in recent years, so that even "accidents" that are slow in manifestation and which rise out of employment-related risk are compensable.[102] This means that, as a threshold matter, chronic stress caused as a result of monitoring may be compensable.

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[100] Stress due to work monitoring should be considered separately from that due to the use of Video Display Terminals (VDTs) per se. A recent OTA report concluded that "evidence for a relationship between stress-related disease and VDT work is still sparse." U.S. Congress, Office of Technology Assessment, *Automation of America's Offices*, OTA-CIT-287 (Washington, DC: U.S. Government Printing Office, December 1985), p. 150. In part, this is due to the methodological problems in attributing stress and stress-related ailments to any one factor or combinations of factors in the workplace. The OTA report did conclude, however, that electronic monitoring in general is associated with the symptoms of chronic arousal, and can lead to increased anxiety, fatigue, psychosomatic complaints, and job dissatisfaction. *Id.* at p. 130. In this regard, the report did not separate computer-based monitoring from customer service observation and call-accounting systems, as is done in this report. However, the way in which monitoring was described, as a system of electronic supervision or feedback in work organization, would include the first two forms of monitoring considered in this report. Moreover, machine pacing—the use of a computer to control when and how fast a task is performed—can lead to anxiety, depression, boredom, dissatisfaction, frequent health complaints, and decreases in productivity with increases in error rates. *Id.* at 128-29; citing Salvendy and Smith (eds.), *Machine Pacing and Occupational Stress* (London: Taylor & Francis, Ltd., 1981).

[101] 1B Larson, *The Law of Workmen's Compensation*, §42 *infra* (1982), and Prosser, *Law of Torts*, §12.

[102] 1A Larson, *The Law of Workmen's Compensation*, §§37.00-39.00 and §§6.00-8.00, *infra*

Even if stress meets these threshold requirements, not all States recognize psychological effects as compensable injuries caused by stress.[103] Only a handful of States would allow recovery for monitoring-induced stress, if that stress can be characterized as "not unusual," or "not in excess of everyday life or employment."[104] Otherwise, in order to be a compensable injury under Worker's Compensation laws, stress must be "unusual,"[105] or even "sudden," "frightening," or "shocking."[106] As electronic monitoring gains acceptance as an ordinary part of the work environment in which it is deployed, any stress that it causes (if any) is arguably "not unusual." In order to be recognized in most States, therefore, electronic monitoring-induced stress must manifest itself in a physiological symptom to be compensable.

Finally, many States today recognize the tort known as "intentional infliction of emotional distress." Although compensation for emotional distress previously required some sort of physical invasion or injury, such as a battery or assault, this is no longer the law in a substantial number of jurisdictions. This notwithstanding, monitoring-induced stress is unlikely to be actionable under tort law. First, the distress-producing act must often be of an "extreme and outrageous" nature—a characterization that is probably not fitting to electronic work monitoring. Secondly, as with the tort of invasion of privacy, consent (found in the implied or explicit terms of an employment contract) will probably vitiate an employee's claim. Finally, many States still require that physical illness or some other nonmental effect be present before allowing recovery.

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[103] Florida, Georgia, Kansas, Louisiana, Minnesota, Montana, Nebraska, Ohio, and Oklahoma do not recognize purely mental or emotional injuries as the result of stress. *Emotional Stress in the Workplace*, op. cit. All jurisdictions recognize stress-related ailments, whether "mental" or "physical," that have an antecedent physical injury. And, with the exception of Ohio, all States recognize "physical" disabilities resulting from stress. 1A Larson, §42.22 et seq.

[104] California, Hawaii, Kentucky, Michigan, New Jersey, Oregon, and West Virginia. See generally "Emotional Stress in the Workplace—New Legal Rights in the Eighties," National Council on Compensation Insurance, 1985.

[105] Arizona, Arkansas, Maine, Massachusetts, New Mexico, New York, Pennsylvania, Rhode Island, Washington, Wisconsin, and Wyoming. *Id.*

[106] Illinois, Maryland, Missouri, Mississippi, South Carolina, Tennessee, Texas, Virginia. *Id.*

PART IV: CONCERNS NOT ADDRESSED BY LAW

Table 16.—A Framework for Addressing Electronic Work Monitoring

	Concern	Criteria	Example of applicable law	Possible "gaps" in law
Purpose of monitoring	Fairness	Relevance Completeness Targeting	National Labor Relations Act; Civil Rights Act; Merit System Principles (as administered in EEO, OSHA, ERISA, EPA, etc.[a]); State Law on Privacy; Constitutional Law[a]	Due process—type guidelines for private employees
Manner and method of monitoring	Autonomy Dignity Privacy	Intensiveness Intrusiveness Visibility Type Leakiness Permanence	State Law on Wrongful Discharge; State Law on Privacy; PCIE Guidelines; Title III of Omnibus Crime Control and Safe Streets Act; Electronic Communications Privacy Act; National Labor Relations Act; Privacy Act of 1974[a]	Privacy in transactional information; "Human Rights"—type law; laws requiring notice of monitoring
Effect of monitoring	Health Stress	Frequency Continuousness Regularity Control	Worker's Compensation Statutes on Stress-Causing Labor	Guidelines/regulations on stress—inducing labor practices

[a] Applies only to Federal employees.

SOURCE: Office of Technology Assessment, 1987.

If we look at the types of concerns raised by electronic monitoring, and at those addressed by law, several broad conclusions follow:

Purpose

- In general, *public employees are better protected against "unfair" monitoring practices than private sector employees.* Constitutional due process protections afford public sector employees the opportunity to challenge dismissals, demotions, or other actions based on monitoring that is irrelevant, unfairly targeted, or incomplete. Although the doctrine of employment-at-will is gradually being eroded in State courts, a suit for unjust dismissal of private sector employees based on unfair monitoring is unlikely to succeed.
- Aside from provisions made in union contracts, *no law compels an employer to implement monitoring with fairness*, unless it can be shown that the employer has taken actions against certain employee(s) based on race, sex, or religion or for motivations that are against narrow public policy exceptions to the employment-at-will doctrine.
- *Electronically monitoring formerly unmonitored tasks may change the very nature of that task, by accommodating the task to the system of measurement.* While some employees may object to this as an unbargained for change in job description, no legal protections, aside from employment contracts, exist.

Manner and Method

- Monitoring most often involves the collection of transactional, rather than substantive, information about employees' performance. *No privacy protections exist against the* collection *of transactional information on employees' activities while at work.* For example, no law prevents the collection of telephone usage data in a call-accounting system, or of performance data in a computer-based monitoring system. If, however, transactional data becomes part of a personally identifiable *record*, then the *subsequent use and disposition of that record is regulated by both Federal and State law.*
- *With some exceptions, no law prevents an employer from using the monitoring systems considered in this report in a secretive, low visibility manner.* For example, an employer is not under a positive duty to reveal to its employees the fact that their keystrokes are being counted, or that their outgoing long-distance calls are being documented. Unless the employee has an expectation of privacy in the activity or location while at work, the employer is free to collect as much information on the employee's performance as it sees fit.
- Although employees may regard some methods of monitoring as an assault on their dignity or autonomy, *there is no legal right to be treated with dignity or as an autonomous person.* Unless the monitoring technique is intrusive—invading either the bodily or mental integrity of the person (as, perhaps, in drug testing or brain wave analysis)—there are no legal protections against monitoring because it is "dehumanizing." Although monitoring may affect interpersonal and power relationships at work, no law prevents employers from using intense, low visibility monitoring. For example, using computers to set the pace at which tasks are accomplished, to measure the employees' performance, or to document time away from a terminal, are not prohibited by law.

Effects

- Although some forms of monitoring *may* cause stress, and *may* therefore have health effects, *no law currently protects workers against stressful environments,* whether the stress is caused by monitoring or by other aspects of the work environment. Lawmaking with respect to stress in the work environment is not unprecedented, however, and several foreign countries have adopted legislation that attempts to address stress in the work environment.

- In some cases, *stress may be a compensable injury under Worker Compensation statutes,* but stress-related health effects are difficult to prove, and are not accepted in a majority of State courts.

What Does the Future Hold?

Depending on the influence of a variety of business, economic, and social factors (see part II), the next 10 to 15 years may see substantial changes in monitoring technologies and settings in which they are conducted. These changes may raise a whole new set of concerns warranting continued congressional scrutiny.

Incremental Changes

Today's monitoring techniques, which are in and of themselves neither illegal nor clearly in conflict with employer-employee custom, necessarily form a precedent for future monitoring techniques. As these techniques become more sophisticated and permeate the work environment, law and lawmakers may have a difficult time distinguishing between each new innovation and the one that preceded it. The law and practice that grows up around a particular form of monitoring may easily assimilate a new, incremental change in the technology or application. The cumulative changes in work environment may be great, despite their gradual and hence imperceptible nature. The framework for analyzing claims to privacy, which relies on an assessment of an individual's "reasonable expectations," [107] can easily become simple descriptive statements of what the monitoring milieu *is*, rather than prescriptive statements of what *ought to be.* An individual's knowledge that certain technologies are capable of intruding into previously private realms may vitiate claims that the individual's expectation of privacy was a reasonable one.[108]

Work Environment Changes

Much of employee behavior in the past went unobserved or undocumented simply because the technical facility for monitoring it did not exist, or was too cumbersome to employ. As noted in chapter 2, however, the use of modern information technology enables employers to keep track of more information on employee performance in much greater detail. Given this new ability, much of the "looseness" of previous work environments may be reduced or eliminated. What was in the past a de facto perquisite of the job, such as a limited ability to make nonwork-related phone calls, or an occasional break from a given task, may in the future become grounds for discipline or dismissal. In such a case, the question is not whether the employer is "within his rights," but whether the work environment should become so rigorously controlled as to eliminate all discretionary employee activity.

Qualitative Changes

As discussed elsewhere in chapter 1, a clear distinction can be made between work monitoring and worker testing; the former is an evaluation of the performance or behavior of an employee, while the latter is an evaluation of an employee's physical or mental state. In theory, it may be possible for legal rules to be framed in accordance with this distinction. However, while the distinction may be relatively easy to make in theory, it is breaking down in fact. Research in the field of psychophysiology, discussed elsewhere in this report, may be able to correlate behavior with psychophysiological states; blurring the boundaries between monitoring work and monitoring the worker.

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[107] *Katz* v. *United States*, 389 U.S. 347 (1967) announced the constitutional "reasonable expectation of privacy" standard that has guided the Supreme Court ever since. It has two components: whether the individual actually expected that his or her activity remain private, and whether that expectation is one that society is prepared to accept as reasonable. This standard has gradually been applied in nonconstitutional, tort-privacy cases.

[108] For example, in *California v. Ciraolo*, a recent case in which police used an aircraft and camera to obtain evidence of marijuana growing in a suspect's backyard, the Court concluded that "[t]he Fourth Amendment simply does not require the police traveling in the public airways . . . to obtain a warrant in order to observe what is visible to the naked eye." The standard for determining what expectations of privacy are reasonable is, in part, dependant on the state of technology for intruding on that privacy.

PART V: POLICY OPTIONS

Before addressing the problem of *how* Congress might act, it is first necessary to consider *whether* and *when* action may be appropriate. Some factors suggest that a "wait and see" posture may be appropriate; uncertainty about whether monitoring causes stress, the lack of judicial precedent, the possibility of privately negotiated restraints on monitoring, and marketplace checks on monitoring are among these. Other factors indicate that Congress may want to act now to alleviate growing concern about monitoring in the workplace. These include the lack of union representation in the bulk of the monitored work force, inadequacy of current law to address concerns over health, privacy, and dignity, difficulties of legislating against powerful economic interests at the State level, and increasing sophistication of the technology itself. Several possible directions of Federal policy are described below.

Option 1: Take no Federal action concerning work monitoring at this time.

Questions of the fairness of work monitoring practice would be left, as they are at present, in the hands of stakeholders, employers and employees. In industries where labor unions are active, collective bargaining with regard to technology change, monitoring, and methods of evaluation should continue under current rules.

Although many unions have adopted positions opposing electronic work monitoring (see table 11), their bargaining strength with respect to it, whether by informal negotiations or by formal collective bargaining or arbitration, is probably not great. However, some forms of monitoring take place within specific industries or companies. An argument can therefore be made that, pending the development of a longer history of negotiations between labor and management on this issue, monitoring is best addressed at the union level; the parties concerned are most familiar with the specific problems, and contracts, rather than national policy, are the best way of approaching what appears to be situation-specific problems (see part III). Under these circumstances, Congress may want to avoid legislating on the issue of monitoring per se, and instead make monitoring an item for compulsory arbitration or collective bargaining under Federal labor law.

This, of course, does not necessarily ensure an outcome that is satisfactory for the majority of monitored workers, who are not unionized and are therefore powerless to negotiate a fair monitoring practice, or any other aspects of the quality of work life, through the collective bargaining process. Furthermore, a growing segment of the work force are temporary workers, who, since they come and go on a weekly or monthly basis, have little ability to improve the quality of worklife.

There is the argument that natural "market forces" may tend to limit unfair monitoring and preclude the need for congressional action even on behalf of nonunionized workers: employee backlash, low morale, and high turnover should dissuade employers from monitoring practices that their workers find onerous. If monitoring is indeed stress-producing, then employers who use it will inevitably see the effects of stress on diminished quality and output of its product or service. The response to this is that many monitored jobs comprise routine work subject to and indifferent to a high turnover rate. And, in many instances, high attrition works to the employer's benefit (by lowering the costs of pension, salary increases, etc.). Thus it is not clear that "natural" checks will be sufficient to ensure that monitoring is not abused.

If natural checks are not sufficient, political action is still available. Unions and other interest groups have worked to pass State level legislation on monitoring, service observation, or VDT health and safety. These activities will probably continue. Some of these attempts may be successful, giving rise to a variety of legislative or regulatory approaches to dealing with issues related to electronic monitoring. Some may serve as models for Federal action at some later time, should the need for the harmonizing effect of national legislation be seen more clearly in the future.

Option 2: Establish whether stress effects of electronic monitoring are an occupational health hazard; if they are, consider creating Federal legislation or regulations governing the use of electronic monitoring.

The effect of monitoring on stress and health—issues which might provide the policymaker with the most direct and least value-laden approach to acting on monitoring—is in a state of scientific uncertainty. There exist few authoritative studies on the effects of electronic monitoring on health. Many studies and informal polls of workers suggest that monitoring has stressful effects, and there is a certain common sense appeal to the idea that working in fast paced, highly monitored environments may be very stressful. However, not much is known about the types of monitoring that are stressful, how stress might be reduced, or how stress due to monitoring manifests itself (if at all) in physiological symptoms. Until more is known about the effects of monitoring on health, policy action under a "stress" rationale may be premature. The policymaker may consider it appropriate, therefore, to initiate studies on stress in the workplace, and on the role that monitoring plays in such stress.

The National Institute of Occupational Safety and Health would seem to be the logical agency to supervise or carry out studies of stress as a workplace hazard. Specific studies of monitored workers would have to be done with an eye to understanding the effects of monitoring independent of other workplace stressors, a major deficiency in existing studies. In addition, however, it would be useful to understand more about the phenomenon of workplace stress in general, given the rising number of worker compensation claims and other evidence of the growing importance of stress in occupational health. Research may reveal that other factors in the workplace are as important as or more important than monitoring in contributing to stress-related illness, and that these should also be covered by protective legislation or regulation.

Option 3: Consider Federal legislation aimed at gaps in current law. This could be in two possible directions: general legislation aimed at establishing certain rights for employees within the workplace or surgical legislation aimed at specific monitoring practices.

There have been *no* court cases challenging the types of monitoring considered in this report. Two conclusions can be drawn from this. The first is that, until the judiciary acts, Congress has very little clue (aside from analyses of the sort found in part III of this chapter) as to the type of legal inadequacies it should address, and ought therefore to wait to legislate on work monitoring. The second is that current law is inadequate to even form the basis for a lawsuit, and that Congress must take the lead in providing rights to monitored employees, should it decide that certain forms of monitoring are pernicious.

Current worker protection legislation gives workers a variety of rights, such as the right to organize, to bargain collectively, to minimum wage, and increasingly, the right to know about health and safety hazards that form part of the working environment. However, U.S. law has not heretofore involved itself deeply in quality of worklife issues nor in issues of personal privacy or dignity in the workplace. There is no legal right to be treated with dignity or as an autonomous person. There is no legal right to a well-designed, interesting job, nor is there law that compels employers to consider employee input in decisions about new technology or new monitoring procedures. To the extent the law treats privacy in the workplace, it looks to a standard of what an employee might reasonably expect to remain private; as mentioned earlier in this chapter, this standard may fail as a guide for action in the face of employer's increasing use of monitoring, surveillance, or testing technologies.

That these issues are not currently addressed in law does not mean they could not be. As is discussed in appendix A, a number of other countries have quality of worklife legislation. Such legislation could give guidelines on the rights to health, safety, privacy, constitutional protections, or information that employees can expect to enjoy in the workplace. As indicated earlier in this chapter, the erosion of the doctrine of "employment-at-will" through antidiscrimination, health and safety legislation, and public interest concerns, has already marked some involvement of the U.S. Government in regulating the work environment. The issue of electronic monitoring in offices is too narrow to serve as a basis for comprehensive work environment legislation. It should be just one factor of many to be considered in determining what rights U.S. citizens have in the workplace, both as employers and employees.

However, assuming that blanket legislation on worklife quality is neither wise nor desirable, Congress might address concerns over specific issues through the use of specific amendatory legislation. If, for example, telephone call accounting is an area of particular concern, Congress might address the problem specifically by amending the Electronic Communications Privacy Act to comport with what it considers "fair" monitoring practice. The President's Council on Integrity and Efficiency guideline may form a template for such legislation, or instead, Congress may mandate alternatives to telephone call accounting discussed in chapter 3 of this report.

Another example of an area of the law not currently addressed, and on which Congress may wish to act, is what might be called *transactional privacy*, or the collection of "information about information." For example, the number of keystrokes, the number of visits to the bathroom, the destination of calls, etc., are all type of information about transactions, rather than about the content of communications or activities (see part II).[109] Although present law, such as the Privacy Act and the Fair Credit Reporting Act, regulates what can be done with transactional information once collected, it does not forbid its collection as such. As we have seen, however, the collection of transactional information, particularly if done on an intensive basis (see part II) can arouse feelings of having one's privacy, dignity, and autonomy invaded. Moreover, because of the power of computers to generate profiles and crossmatch many transactions, transactional information can yield informed estimates of the substantive content of communications or patterns of behavior—it can be, in other words, a "back door" for getting at personal information that existing law regulates.

Certainly, to forbid or regulate the collection of all transactional information would be unreasonable. Much transactional data collected by electronic monitoring software is used to monitor equipment utilization, to track totals of transactions made, and to determine whether security systems are working properly. The collection of transactional data becomes most subject to controversy when it is collected about the performance of an individual worker. It may be that Congress would choose to treat electronic monitoring as a "right to know" issue for workers; that is, employers could have the right to collect whatever kind of transactional data they wish about employee performance, but would be required to give employees access to, and if need be, correct, this information.

As this report has indicated throughout, however, the issue of work monitoring cannot be adequately understood, nor appropriately addressed, in isolation from larger labor-management, privacy, and the health and safety context in which it is embedded. Nor will specific policy actions taken with respect to particular forms of monitoring necessarily end the controversies arising out of the application of new technology forms in the workplace. The policymaker should therefore be aware that an exclusive focus on the forms of monitoring considered in this report will at best form the basis for a series of patchwork solutions to what has been a perennial issue between workers and employers.

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[109] *Transactional* information, it will be recalled, differs from *substantive* information, in that the latter reveals the content or meaning of communications or documents. Transactional information, in contrast, reveals facts about communications or documents.

Appendixes

Appendix A

Notes on Computer Work Monitoring in Other Countries

Introduction

Because the American economy is so tied to the global economic structure, increasing attention has been given to approaches taken by other industrial nations in their efforts to maintain a competitive edge and adapt to microelectronic technology. It is helpful to look at the experience of other countries in evaluating what lessons might be learned with respect to work monitoring. There are a number of ways in which the different legal structure and the institutional structure of labor relations has resulted in different policies toward monitoring.[1]

The American labor relations system and labor law model differ importantly from many other industrial nations. Most other industrial democracies have a higher level of unionization. Table 17 shows the approximate percentage of the work force that is unionized in the United States and in 15 other developed countries. Given the higher level of union participation in the work force in some of these countries, unions have naturally had a greater influence in a wide variety of workplace issues, including introduction of computer technology and use of work monitoring. In addition many of our competitor nations have a tradition of governmental involvement in labor relations and a more developed tripartite government-labor-management approach to industrial policy, economic development, and growth. This approach has no real equivalent in this country, but there are increasing calls for some efforts in this direction.

A tradition of worker participation, including employee involvement in applying new technology in factories and offices, is also more developed in some other industrial countries. In some countries, this participation depends almost entirely on the collective bargaining process, as for example in England, Australia, and Canada, where the adversarial labor relations model is closer to that of the United States. In others, however, worker participation or "co-determination" is required by law, as in Sweden, Norway, Germany, and Holland. In some of these countries as well, work environment laws define certain workplace rights and give guidelines for job design. Tables 18 and 19 list some work environment legislation. The Norwegian Work Environment Act of 1977 reads, in part:

> **General requirements.**—Technology, organization of the work, working hours and wage systems shall be set up so that the employees are not exposed to undesirable physical or mental strain and so that

Table 17.—Percent of Unionized Workers by Country

United States	22%
France	23
Japan	30
Canada	35
Switzerland	35
West Germany	40
Netherlands	40
Italy	50
Ireland	50
Britain	52
Austria	60
Belgium	65
Norway	65
Denmark	70
Finland	85
Sweden	90

SOURCE: Alan Westin and Russell Pipe, "Electronic Monitoring in Other Industrialized Countries," contractor report prepared for OTA, 1986.

Table 18.—European Work Environment Acts Providing Goals for Changing Working Conditions During Office Automation

Federal Republic of Germany	The Works Constitution Act of 1972
The Netherlands	Working Environment Act of 1980
Norway	Work Environment Act of 1977[b]
Sweden	Working Environment Act of 1974
Denmark	Act Respecting the Working Environment
German Democratic Republic	Labour Code as Amended, June 1977

[a] These Acts deal with all working conditions, thus are specifically applicable to office automation.

[b] Also known as Act Respecting Worker's Protection and the Working Environment.

SOURCE: Office of Technology Assessment, 1984.

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[1] Parts of this section draw heavily from Steven Deutsch, "The International Context of Labor-Management Relations: Implications for Workplace Monitoring," paper prepared for OTA, 1986.

Table 19.—European Acts Requiring Employers To Provide Information About New Technology and Worker Representation in the Decisions About the Quality of Worklife

Country	Information provision	Work representation
Federal Republic of Germany	Works Constitution Act of 1972[a]	Works Constitution Act of 1972
The Netherlands	Works Council Act of 1979[a]	Works Council Act of 1979
United Kingdom	Employment Protection Act of 1975[b]	Employment Protection Act of 1975
France	Act No. 82-915 of 28 October 1982	Act No. 82-689 of 4 August 1982
Sweden	Act Representing Co-Determination of Work of 1976[b]	Act Representing Co-Determination of Work of 1976

[a] Information is provided to a Work Council which can be a cross-section of all interested parties including government, industry, and labor.

[b] Information is provided to the worker or worker representative.

SOURCE: International Labour Organization, *Automation: Work Organization and Occupational Stress* (Geneva, Switzerland: 1984).

> their possibilities of displaying caution and observing safety measures are not impaired. . . .
>
> **Arrangement of work.**—The individual employee's opportunity for self-determination and professional responsibility shall be taken into consideration when planning and arranging the work.
>
> Efforts shall be made to avoid undiversified, repetitive work and work that is governed by machine or conveyor belt in such a manner that the employees themselves are prevented from varying the speed of the work. Otherwise efforts shall be made to arrange the work so as to provide possibilities for variation and for contact with others, for connection between individual job assignments, and for employees to keep themselves informed about production requirements and results.
>
> **Control and planning systems.**—The employees and their elected union representatives shall be kept informed about the systems employed for planning and effecting the work, and about planned changes in such systems. They shall be given the training necessary to enable them to learn these systems, and they shall take part in planning them.

This law, and the Swedish Work Environment Act of 1978, were both based on evidence that machine-paced, monotonous work, done in social isolation and involving shift work, leads to unhealthy outcomes in both emotional and physical terms.[2]

There is a well-established international communications system across management and union circles which has shared research results and experience in job redesign, improvement of working life quality and participative management. There is evidence of a substantial growth of a more participative and cooperative trend in the American labor-management relations community,[3] and the Federal Government has started an initiative on labor-management cooperation in the U.S. Department of Labor.[4]

Since collective bargaining covers only one-fifth of the American work force, other initiatives have been explored by advocates and policymakers, including the use of occupational safety and health laws and agencies (which somewhat parallel work environment laws in other nations that have addressed job stress, work organization and technology concerns). Concern over health effects, stress-related worker compensation claims, are among the driving forces for reform here. Thus far, only modest changes in Federal legislation and standards, such as the OSHA hazard communication standard, have been seen. More activity seems focused at the State and local level in efforts to pass legislation to protect employees against possible health and safety hazards associated with video display terminals (VDTs). European developments have been a significant stimulus for some of this effort.

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[2] Bjorn Gustavsen and Gerry Hunnius, *New Patterns of Work Reform: The Case of Norway* (Oslo: Oslo University Press, 1981); Bertil Gardell and Bjorn Gustavsen, "Work Environment Research and Social Change: Current Developments in Scandinavia," *Journal of Occupational Behavior*, vol. 1, January 1980.

[3] See, for example *Business Week*, "The Hollow Corporation," Mar. 3, 1986; Steven Deutsch and Sandra Albrecht, "Worker Participation in the United States: Efforts to Democratize Industry and the Economy," *Labour and Society*, vol. 8, July-September 1983, pp. 243-269.

[4] See U.S. Department of Labor, Bureau of Labor-Management Relations and Cooperative Programs, *U.S. Labor Law and the Future of Labor-Management Cooperation*, BLMR 104 (Washington, DC: 1986).

Policy Approaches to Monitoring in Selected Countries[5]

West Germany

Both the West German Trade Union Federation (DGB) and a number of individual unions have been active in trying to set ergonomic and work environment standards for VDT users. In 1979-80 German unions opened a campaign to write "model codes" for VDT work into both industrywide and plant-level agreements. These models included a ban on individual monitoring, for example: "It shall not be permitted to monitor the performance of workers, for the purposes of measurement, control, or comparison, by use of the installed [VDT] equipment."[6] A study of about 50 actual contracts concluded during this period found that work monitoring clauses like the above were often included. Part of the concern about monitoring arises at least partly from the fear of social isolation of monitored workers. A study of bargaining agreements found that such clauses are often included in actual labor management agreements as well.

Another example of a clause preventing monitoring comes from the 1984 contract between the Commmerzbank AG and the bank employees' union:

> The performance or behavior of employees shall not be effected by means of existing or planned EDP. Data and programs which serve to verify performance or behavior shall be erased. . . .; A guarantee shall be given that personal data on the employees which are a by-product of the working process or which can be deduced from work process data will not be such as can be used or interpreted as a check on personnel behavior or performance.

An interesting feature of the West German labor relations scene is the Works Council, an elected group which management must consult in all matters of "internal order" in an enterprise; its functions are independent of the collective bargaining process. Works councils are active in the process of "co-determination," that is, they represent the employees' voice in the selection of technology and in other matters. According to the Act on Works Constitution, which created works councils,

> . . . the works council will, if no statutory rules or collective bargaining agreement exist, co-determine: . . . the introduction and use of technical installations that are intended to monitor conduct or performance of employees.

Norway

There is an understanding in Norway, among both unions and employers, that the work measurement capabilities of new office technologies have great potential for increasing productivity and helping in planning and management of work. However, there is a strong aversion to using the information for individual performance measurement.

The general trend is to use the work monitoring system to collect information, but to only use aggregate data. The social security administration, for example, recently introduced a computerized case handling system. The daily work statistics on individuals are collected by the system, but the reports issued are aggregated by work groups. At the present time the data are available to both union and management as part of an experiment designed to test the productivity of two different work organization approaches.

Similarly, the bank union has included in its technology agreements with employers that data on work volume and speed be used only at the work group level:

> . . . local regulations laid down under the collective agreement are designed to ensure that such information . . . is not used to evaluate employees. The union points out that the only way to assess the impact on employment and working conditions of new technologies. . . . is by using such work measurement devices. However the union stresses the importance of controlling the use to which the information is put.

Sweden

The Swedish Codetermination Act of 1976 requires that employee representatives participate in decisions about computer system design, including the possible use of electronic monitoring. Further, The Work Environment Act of 1978, which guarantees workers the right to a "satisfactory" work environment, is generally interpreted to mean that jobs should be designed to avoid machine pacing or individual computer monitoring, if possible.

Electronic monitoring systems, as negotiated between employers and unions, are generally only used to measure group performance, as in Norway.

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[5] Much of the information in this section comes from Alan F. Westin and Russell Pipe, "Employee Monitoring in Other Industrialized Democracies," contractor report prepared for OTA, 1986.

[6] "West Germany: Workplace Agreements on New Technology," *European Industrial Relations Review*, No. 106, November 1982, pp. 7-9. Cited in Alan F. Westin and Russell Pipe, "Employee Monitoring in Other Industrialized Democracies," contractor report prepared for OTA, August 1986, p. 23.

However, in some cases, where the union has agreed to the necessity, individual monitoring can and has been used. This has been the case, for example, where computers are used to keep track of inventory in order to prevent theft. In addition, nonunionized temporary workers are sometimes paid by piece rates, so their work is sometimes monitored electronically.[7]

Canada

Canada has a voluntaristic labor union system similar to that in the United States, although the level of unionization is higher. There are no specific provisions dealing with work monitoring in any of Canada's national or provincial labor codes, nor have there been any regulations on monitoring issued by national or provincial regulatory authorities, although several have been considered. What limitations on employer conduct that have taken place have been the result of (a few) collective agreement clauses negotiated on that topic, or arbitrator rulings interpreting rights of employees under contract.

Electronic monitoring appears to be fairly common in Canada, in the same sorts of work it is applied to in the United States. Service observation is also an established practice in the telephone industry and in other types of telephone customer service.

A survey conducted for the Canadian Labour Congress' (CLC) 1980 study of VDT health and safety issues found that monitored workers experienced stress-related illnesses (general tiredness, irritability, headaches, and sleeplessness) to a greater extent than nonmonitored workers. As a result, the report recommended that "direct electronic monitoring of individual worker's activities and productivity be discontinued." Where productivity monitoring was deemed necessary, the report suggested that indirect or aggregate monitoring techniques be used.

Canadian unions began mobilizing around VDT related issues, including work monitoring, in the early 1980s. Model contracts proposed by the Canadian Union of Public Employees and the Canadian Labour Congress, among others, contained language banning monitoring of individuals. For example:

> It is recognized that volume measurement may be necessary to obtain an objective evaluation of the level of production of a group, a section or an office. However, there shall be no individual work measurement.[8]

Such language has been adopted in a few contracts. The Postal Workers, for example, negotiated for work measurement by group in 1981 when new equipment was installed. The Telecommunications Workers got a commitment from British Columbia Telephone Co. that data collected on computerized cash registers at Phone Marts would be used only for inventory purposes, rather than individual performance.[9]

A task force appointed by the Canadian Ministry of Labour also addressed the question of electronic monitoring in its 1982 report *In the Chips: Opportunities, People, Partnerships.*" The task force considered monitoring "the most serious manifestation" of the introduction of new office technology, pointing to the stress, performance pressure, and lack of autonomy suffered by monitored workers.

> The Task Force regards close monitoring of work as an employment practice based on mistrust and lack of respect for basic human dignity. It is an infringement on the rights of the individual, and undesirable precedent that might be extended to other environments unless restrictions are put in place now. We strongly recommend that this practice be prohibited by law.

The Task Force recommendations were in general considered too sweeping, too costly, and too "pro-labor" and were not endorsed by the Ministry of Labour. However, there have been attempts to pass legislation at the provincial level to create ergonomic standards for VDTs and to ban individual monitoring. Legislation was introduced in Ontario, British Columbia, and Saskatchewan between 1981 and 1985, but none of the bills passed.

Japan

Interviews and published reports indicate that individual electronic monitoring is not common in Japan. This may be due in part to the still low penetration of automated equipment into offices there, but is most strongly related to cultural values toward work. According to an executive of one computer firm:

> Individual work monitoring is not an issue in Japan. Employers do not measure individual output and make individual judgements on that basis. If

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[7] Interview with Elizabeth Lagerlof, Labor Specialist, Swedish Embassy, Mar. 26, 1986.

[8] Canadian Union of Public Employees, Model contract on Technological Chamge, 1982. Cited in Westin & Pipe, op. cit.

[9] Westin and Pipe, op. cit.

> they tried to do that, unions would complain, because it would violate the union-company attitude toward worker productivity. The climate in our workplaces is for employess to work hard, and for the whole work group—employees and managers—to strengthen the norm of hard work. We would not measure each person.

In one documented case, individual monitoring has been used, not to increase worker performance, but to insure that employees did not hurt themselves by working too hard. In the 1960s, a wave of repetitive strain injuries among keypunch operators was attributed to the high number of keystrokes they performed daily. Several companies and unions proposed voluntary limits on keystrokes and in 1964 the Ministry of Labor issued a guideline of 12,000 keystrokes per hour. The guideline also called for breaks of 10 to 15 minutes per hour of work, a total of 300 minutes keypunching per day, and regular medical exams. To enforce these guidelines, employers have monitored individual performance, at least on a test basis. These Ministry of Labor guidelines are still in use, and are the model for updated guidelines now being considered for VDT work.[10]

Privacy Legislation

Most Western European nations have privacy legislation intended to ensure that personal privacy is not eroded as a result of data processing applications. Most of these laws were passed in the 1970s, beginning with Sweden's Data Act of 1972; this was the same epoch as the work of the U.S. Privacy Protection Commission (final report in 1977), the passage of the Privacy Act, and several other privacy-related laws in the United States.

Unlike the approach of the United States, however, European laws do not leave it to the injured individual to complain or sue if he or she believes that personal data has been misused. Rather, independent government agencies (data protection authorities) were created to supervise and enforce prescribed data handling practices. All databases containing personal information must be registered with the data protection authority so that their use can be supervised. In most cases, this applies to both government and private databases. One principal focus of the data protection authorities has been to prevent linking of databases to build up "profiles" or "dossiers" of citizens.

Table 20 outlines the main provisions of legislation of 11 nations that use the Western European model of privacy protection. These features generally include a requirement that the data be collected for legitimate reasons and used only for the specified purpose, and that the individual have the right to inspect the data. In some countries, citizens can withhold sensitive information; anyone storing it in a database without their consent would be in violation of the data protection law.

While the words "work monitoring" do not appear in the privacy legislation of any European country, computerized work monitoring is covered by data protection legislation to the extent that: 1) information is collected and stored by computer and 2) information can be related to a specific employee. Table 21 indicates coverage of computer usage monitoring, telephone call accounting, and work measurement records under the laws of 11 nations.

Although records created by work monitoring are covered by privacy laws in these nations, it appears that these laws have not been used extensively to prevent or modify any monitoring practices that unions or individual workers might have found objectionable. Data protection authorities have been preoccupied with their first-line responsibility of bringing major government and private databases into compliance with the law, and recently have had to deal with increasingly frustrating problems of enforcing the laws in an era of proliferating personal computers. There appear to be no jurisdictional problems involved with data protection authorities becoming involved in the case of some inappropriate use of work monitoring records; data privacy officials in some countries have expressed increased interest and frustration with their inability to regulate such aspects of the new information technologies. It appears that the unions, works councils and labor courts have not requested their involvement. Thus, trade unions and labor law will continue to be the focal point of actions to deal with monitoring.

Privacy Legislation and Telephone Call Accounting

In West Germany, telephone call accounting has been the topic of at least two court cases and the subject of a continuing disagreement between the privacy commission and the Federal government. The privacy commission objects to collecting records of personal telephone calls by government employees and urges utmost restraint even in keep-

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[10] Westin and Pipe, op. cit. Information compiled by Alan F. Westin, from interviews with industry, legal, and academic experts, Tokyo, May 1985.

Table 20.—Main Provisions of Foreign Personal Data Protection Legislation Relevant to Coverage of Employee Monitoring

	National legislation											
Provisions	Austria	Canada	Public Denmark	Private Denmark	France	Germany FR	Iceland	Israel	Luxembourg	Norway	Sweden	UK
Scope of application:												
Central government	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Provinces/states	Y	N	Y	N	Y	Y[e]	Y	Y	Y	Y	Y	Y
Private sector	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Covers all information traceable to identifiable individuals	Y	Y	Y	Y	Y	Y	N[a]	N[b]	Y	Y	Y	Y
Information collected and/or processed using computers	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Limits placed on personal data collection	Y	Y	Y[c]	Y	Y	Y[d]	Y	Y	Y	Y	Y	Y
Personal information must be collected for specified, legitimate purposes	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Individuals have right of access to inspect personal information	Y	Y	Y	Y	Y	Y[a]	Y	Y	Y	Y	Y	Y
Sensitive personal details specified (collection only with data subject's knowledge and consent)	N	N	Y	Y	Y	N	Y	N	Y	Y	Y	Y

KEY: Y = Yes; N = No

[a] Covers information concerning private affairs, such as financial situation of individuals.

[b] Covers information on an individual's personal status, intimate affairs, economic position and vocational qualifications.

[c] Collection of personal data limited unless it is "natural part of the normal operations of an enterprise."

[d] Personal information collection is permissible if it serves the purpose of a contractual relationship or there is a legitimate interest in (a business) storing it.

[e] State laws may be enacted that for personal data maintained by the public sector.

SOURCE: Russell Pipe and Alan F. Westin, "Employee Monitoring in Other Industrialized Democracies," contractor report prepared for OTA, 1986.

Table 21.—Applicability of Foreign Personal Data Protection Legislation to Employee Monitoring

	National legislation											
Type of monitoring	Austria	Canada	Public Denmark	Private Denmark	France	Germany FR	Iceland	Israel	Luxembourg	Norway	Sweden	UK
Employee computer-usage monitoring (by IDs, terminals, and passwords)	Y	Y	Y	Y	Y	Y[a]	U[b]	Y[c]	Y	Y[a]	Y	Y
Telephone-call accounting	Y	Y	Y	Y	Y	U	U	Y[c]	Y	Y[a]	Y	Y
Work measurement	Y	Y	Y	Y	Y	Y[a]	Y	Y	Y	Y[a]	Y	Y

KEY: Y = Yes; U = Uncertain.

[a] Personal data covered by this law must be organized or filed so as to be retrievable automatically using identifiers that can be linked to a particular person.

[b] Information must be related to a person's private affairs, such as financial situation.

[c] An official translation (ch. I, para 2) states that it is an infringement of privacy to: 1) spy on or trail a person in a manner likely to harass him, or any other harassment; and 2) "listen in."

SOURCE: Russell Pipe and Alan F. Westin, "Employee Monitoring in Other Industrialized Democracies," contractor report prepared for OTA, 1986.

ing records of official call destinations. Of particular concern are calls by union representatives and others (counselors, medical services) in sensitive positions. In one agency, on the basis of an unwritten understanding in effect since 1984, calls by the "personnel council" have been channeled through a separate telephone line to bypass the call-accounting system. In general, however the Federal government finds value in call accounting and has not complied with the privacy commissioner's request to terminate the practice and erase previous records. A similar controversy is going on at the state level.

Conclusion

The force of law, tradition of labor-management relations, and the current economic and political milieu have shaped the American approach to dealing with the new technology at the workplace, including electronic monitoring. It is a model which is different in important ways from the more centralized, regulatory, legislated model of employer-employee relations in many other industrial nations. While voluntary and recommended styles of participative management and other approaches towards dealing with microelectronic technology developed abroad may have growing influence in the United States, there will continue to be a distinctly different approach taken in this county in the foreseeable future.

Appendix B

Privacy and Civil Liberties Implications of Testing Employees in the Workplace

Introduction

The focus in this section shifts from the monitoring of work to the testing of employees. It looks at some of the tests that can be given by employers in hopes of predicting some aspects of an employee's future work quality. Can technology help employers predict how good an employee will be before the person is hired? Could there be some corporate equivalent of a carnival "weight and fate" machine, capable of succinct predictions: "This woman will try to embezzle money: don't trust her." "This man will have a heart attack at 45; don't invest in training him." "This one uses drugs: don't hire him." "This is is a healthy, honest worker; hire her!"

Clearly, such a single tool for personnel selection does not exist, but a growing number of employers are relying on tests for employees and job applicants to try to predict behavior or personal characteristics that may affect their job performance. Limited evidence suggests that over the past few years workplace testing has been undergoing a revival that may surpass the heyday of psychological testing in the 1950s. The future trend may well be in the direction of more testing. If this is the case, then the controversy about worker rights, workplace privacy, and privacy of personnel records, may intensify.

Issues such as those explored in earlier chapters will continue to arise and become more prominent concerning what information is reasonable and necessary for an employer to have, who should have access to it, and how it ought to be used, and where the line should be drawn between information that is personal and private and that which is not.

As noted earlier, the past pattern has been for these new capabilities to come into use in a piecemeal fashion over time. Sometimes, however, they are put to use almost immediately, before adequate research can be conducted, as with polygraph testing, and before consideration can be given to the long-term consequences for society. When this happens, issues arise that have no established legal, ethical, or other useful framework for evaluation.

This appendix focuses on three technologies that are already in use today: polygraphs, drug tests by urinalysis, and genetic screening. In addition, the appendix will review some research in the field of brain wave analysis that could give rise to new forms of worker testing in the next few years.

Some of the technology used for testing is not new. The polygraph, for example, has had limited use in law enforcement for 60 years. Now, however, its dominant use is in personnel screening; of 2 million polygraph tests given annually, about 98 percent are given by employers to job applicants and employees.[1] Medical screening for drug or alcohol use, formerly used primarily as a diagnostic tool in clinical settings, began to be used by the Department of Defense in the 1970s to identify returning military personnel with drug problems. Now, nearly all military personnel, millions of private employees, and a growing number of government employees find that their jobs depend on passing the drug test.

Genetic screening, an emerging technology for predicting a person's likelihood of developing diseases, is now used only in a few workplaces, usually to identify workers who may be hypersusceptible to chemicals found in those workplaces. However, tests for many common diseases will be commercially available within the next 5 years, and employers may want to include them in pre-employment physicals.

Still in the research stage are tests based on brain waves. Currently under study is the possible use of brain wave analysis in monitoring concentration, detecting lies, and predicting certain illnesses. A computer-based system to detect drug use by measuring brain waves is already on the market.

Controversy about worker testing focuses on the accuracy and predictive value of the tests. Employers who test employees for drug use or honesty may believe that the tests work or at least that the fear of testing discourages the unwanted behavior. Washington Area Metropolitan Transit Authority, for example, noted a decrease in drug use and in accidents since beginning its drug test program. Officials of the Eckerd Drug Co. believe that requiring a test of all applicants and periodic tests of employees, is the best way to deter theft and "keep basically honest people basically honest." But there have been no systematic studies of employee theft to support this claim.[2]

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[1] Harrison Donnelly, "Privacy in the Workplace," *Editorial Research Reports*, Mar. 21, 1986, p. 214, citing figures from the American Polygraph Association.

[2] Kenneth F. Englade, "The Business of the Polygraph," *Across the Board*, October 1982, pp. 20-27.

On the other hand, there are concerns about testing, and many argue that these gains, if they exist, are achieved at a heavy cost: undue intrusion into private lives of employees; creation of an atmosphere of fear and intimidation in the workplace; and false accusation and denial of job opportunities for many innocent people.

This chapter outlines some trends in worker testing—who uses it, what can be learned, and directions of research. The chapter also explores why worker testing is controversial, and looks at some of the ethical and legal questions raised by its use.

Polygraph Testing

Extent of Honesty Testing

Employee theft is a major business problem, resulting in losses estimated at $5 billion to $10 billion annually.[3] To counteract it, employers are increasingly using "honesty testing" on workers, either using the polygraph ("lie detector") or paper-and-pencil honesty tests. One major object is to cut down on employee theft by screening out potential thieves before they are hired. In addition, a number of employers use polygraphs as part of internal investigations of theft and other wrongdoing, and some administer polygraph tests on a regular or random basis as a deterrent to wrongdoing.

A testing industry has grown in response to this demand, and perhaps has helped to fuel the demand. While some large firms have in-house polygraphers (one Florida drug firm has a staff of 40), most rely on detective or personnel security firms who provide polygraph services on a contract basis. There is no good estimate of the total number of such firms throughout the country, but a gauge of their growth can be found by looking at selected cities. In 1970, for example, there were only three such firms listed in the Atlanta yellow pages. By 1975 there were 20, and in 1985 there were 33.[4] At present 3,000 polygraphers belong to the American Polygraph Association, but it is estimated that there are 8,000 to 9,000 full-time polygraphers nationally. Some are employed by law enforcement agencies, some by detective agencies, and some are part of in-house security departments of large firms.[5]

Paper-and-pencil honesty testing has gained popularity in the past few years, partly in response to criticism of polygraphs and partly as a lower cost alternative. Compared to a cost of $40 to $50 per test for polygraphy, paper-and-pencil tests can be administered and scored for $8 to $15 a piece.[6] At the present time, about a dozen firms nationwide are dominant producers of these tests, two of the largest being John E. Reid & Associates in Chicago and Stanton Corp. in Charlotte, NC. At least 2 million of these tests are given annually in preemployment screening.

Thirty-two States have legislation limiting the use of polygraphs in employment, including 12 with an outright ban on employers' requiring or requesting that employees take a polygraph test. Nine States require licensing for the polygraph operator. Four States have legislation regarding the types of questions that may be asked, prohibiting questions on such topics as sexual preference, religion, union affiliation, or politics. Twenty-one States have laws providing that polygraph tests be voluntary[7] (see table 22).

At the present time there seem to be few State laws dealing directly with paper-and-pencil honesty tests. One 1986 Massachusetts law outlaws honesty tests that amount to paper-and-pencil polygraph tests. There have been several attempts to pass polygraph legislation at the national level, including bills in the 99th Congress.[8]

Part of the reason for the growing use of honesty testing is the increasing difficulty and high cost of doing good background checks. A thorough check might cost as much as $250, and many employers hesitate to give detailed information about former employees, partly due to fear of libel suits.[9]

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[3] Susan Gardner, "Wiretapping the Mind: A Call to Regulate Truth Verification in Employment," *San Diego Law Review*, vol. 21 No. 2, March 1983, pp. 295-323.

[4] Kenneth F. Englade, "The Business of the Polygraph," *Across the Board*, October 1982, pp. 20-27; Atlanta Yellow Pages, 1985-86.

[5] Joseph Buckley, III, President, John E. Reid & Associates, personal communication, Aug. 19, 1986.

[6] Susan Denzler, et al., "Can You Pass The Job Test," *Newsweek*, May 5, 1986, pp. 46-53; Kenneth F. Englade, "The Business of the Polygraph," *Across the Board*, October 1982, pp. 20-27.

[7] William E. Hartsfield, "Polygraphs," *Labor Law Journal*, vol. 36, November 1985, pp. 817-834.

[8] Employee Polygraph Protection Act of 1985 (H.R. 1524) passed the House; Polygraph Protection Act of 1985 (S. 1815) was reported out by the Committee on Labor and Human Resources but not acted on by the Senate.

[9] "The High Cost of Employee Theft," *Dun's Business Mouth*, October 1982.

Table 22.—State Legislation on Polygraph Testing

	Employer may not test or request test	Employer may not require test	Employee must be told test is voluntary	Certain personal questions prohibited	License for polygraphers
Alabama			X		
Alaska	X				
Arizona			X		
Arkansas			X		
California		X			
Colorado					
Connecticut	X				
Delaware		X			
District of Columbia	X				
Florida					X
Georgia					X
Hawaii		X			
Idaho		X			
Illinois				X	
Indiana					
Iowa		X			
Kansas					
Kentucky					X
Louisiana			X		
Maine	X				
Maryland		X			
Massachusetts	X				
Michigan	X				
Minnesota	X				
Mississippi					X
Missouri					
Montana		X			
Nebraska		X			
Nevada			X	X	
New Hampshire					
New Jersey	X				
New Mexico	X				
New York	X				
North Carolina					X
North Dakota					X
Ohio					
Oklahoma			X		
Oregon	X				
Pennsylvania		X			
Rhode Island	X				
South Carolina			X		X
South Dakota					
Tennessee			X		X
Texas			X		
Utah		X			
Vermont					X
Virginia[a]					
Washington		X			
West Virginia	X				
Wisconsin		X			
Wyoming					

[a] Applicant or employee must give written consent and be told all questions in advance.

SOURCE: Adapted from William E. Hartsfield, "Polygraphs," *Labor Law Journal*, vol. 36, November 1982, pp. 817-834.

Technological Considerations

Polygraph technology has not changed substantially since it came into use in 1921.[10] The polygraph measures and records a number of physiological responses, including skin resistance, respiration, and blood pressure, while the subject answers a series of questions posed by an interviewer. The most commonly accepted theories of polygraphy hold that the subject's guilt and nervousness will produce measurable physiological reactions when he or she is lying. These reactions must be interpreted by a trained polygraph interviewer.

Critics argue that the physiological change during lying is still not well understood, and even proponents of polygraphy agree that a unique set of physiological reactions to lying has not been found. The reactions often attributed to lying can also be caused by anxiety, anger, or humiliation. Being required to take a polygraph test elicits precisely these feelings in many people.

In determining the accuracy and reliability of polygraph tests, it is important to consider whether the test is used for investigating a specific criminal incident or for screening. The questioning technique is also important, as discussed in a previous OTA report.[11] The polygraph appears to be most reliable when the interviewer is asking relevant questions about a specific event (e.g., "Did you take $200 out of the cash drawer yesterday afternoon?") and comparing the reactions to a list of irrelevant control questions (e.g., "except for what you told me already, did you even steal anything before the age of 21?").[12] Subjects that react more strongly to relevant questions than control questions are believed to be deceptive. OTA's previous review of research on polygraph validity found that most research has focused on use in specific incidents. Methodological problems and differences made it difficult to draw overall conclusions about validity. In the studies reviewed, accuracy rates ranged from 0 to 100 percent, and innocent people were more likely to be assessed deceptive than vice versa. A summary of the findings of the OTA review is shown in table 23.

Table 23.—Accuracy of Polygraphs for Specific Incident Criminal Investigations[a]

Field studies	Range	Average
Six prior reviews	64-98%	
OTA review of 10 individual field studies:		
Correct guilty	70.6-98.6%	86.3%
Correct innocent	12.5-94.1	76.0
False positive[b]	0-75.0	19.1
Fasle negative[c]	0-29.4	10.2
OTA review of 14 individual analog studies:		
Correct guilty	35.4-100.0%	63.7%
Correct innocent	32.0-91.0	57.9
False positive	2.0-50.7	14.1
False negative	0-28.7	10.4

[a] Includes some investigations at work site.
[b] False positive—innocent persons found deceptive.
[c] False negative—guilty persons found nondeceptive.

SOURCE: Adapted from U.S. Congress, Office of Technology Assessment, *Scientific Validity of Polygraph Testing: A Research Review and Evaluation—A Technical Memorandum*, OTA-TM-H-15 (Washington, DC: U.S. Government Printing Office, November 1983), p. 97.

Validity in screening situations, where questions are of a more general or hypothetical nature ("Have you ever taken something that didn't belong to you?") and responses cannot be easily compared to control questions, is more problematic. Some critics suggest that screening polygraph tests are strongly biased against honest people. In this view, the basically honest person, the one who feels guilty about small past wrongdoings or angry at a challenge to his or her integrity, is likely to do worse on a polygraph test than a person with less developed conscience.[13] The American Psychological Association, for its part, charges that polygraph tests produce "an unacceptable number of false positives."[14] The OTA report found no studies evaluating whether polygraph testing is valid in personnel security situations.[15] OTA is currently reviewing the Defense Department's polygraph test and research programs.[16]

The validity of pencil-and-paper honesty tests has also been called into question, and there appears to be a dearth of independent research on their validity. Some critics note that many "correct" test answers are based on values and definitions of honesty that may not be shared by all test takers.[17]

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[10] Kenneth F. Englade, "The Business of the Polygraph," *Across the Board*, October 1982, pp. 20-27.

[11] For a description of the various polygraph techniques and an evaluation of scientific research on polygraphs, see, U.S. Congress, Office of Technology Assessment, *Scientific Validity of Polygraph Testing: A Research Review and Evaluation—A Technical Memorandum* OTA-TM-H-15 (Washington, DC: U.S. Government Printing Office, November 1983).

[12] Ibid.

[13] David T. Lykken, "Detecting Deception in 1984," *American Behavioral Scientist*, March/April 1984, pp. 481-499.

[14] "Can You Pass the Job Test," *Newsweek*, May 5, 1986, pp. 46-53.

[15] For a description of the various polygraph techniques and an evaluation of scientific research on polygraphs, see, U.S. Congress, Office of Technology Assessment, *Scientific Validity of Polygraph Testing: A Research Review and Evaluation—A Technical Memorandum* OTA-TM-H-15 (Washington, DC: U.S. Government Printing Office, November 1983).

[16] OTA, *Review of the Defense Department's Polygraph Test and Research Programs* forthcoming (1987).

[17] Quoting Michael Merbaum in "Can You Pass the Job Test," *Newsweek*, May 6, 1986, p. 49.

Legal and Ethical Considerations

The privacy issue pits the employees' interest in being left alone, and in keeping certain information private, against the employers' interest in protecting their businesses and selecting employees by their standards.

However, questions addressed to workers in on-the-job polygraph tests sometimes go beyond job-related topics and probe into sensitive areas of personal life. Several critics have charged that the purpose of such questioning is not only to intimidate workers but to screen out minority group members or those who may show dissident tendencies or an inclination to join unions. At least four States have legislation prohibiting employers from asking questions about politics, religion, union affiliation, or sex life.[18]

Drug Abuse Testing

Rationale and Extent of Drug Testing

The problem of drug abuse on the job has gained increased attention in the past few years, but it is not a new problem. In fact, overall abuse of most drugs in the United States has held steady or declined since 1979.[19] Substance abuse is still a major problem, however, and the current public awareness and concern should help to reduce it further.

Alcohol abuse is estimated to cost the U.S. economy a total of $89.5 billion per year in lost employment, illness, reduced productivity, and death and injury due to automobile accidents. Other types of drug abuse are estimated to cost society about $46.9 billion per year.[20] The U.S. Chamber of Commerce estimates the direct costs of drug and alcohol use among workers costs employers $60 billion per year in reduced productivity, increased medical claims, and absenteeism.[21] Workers who are dependent on alcohol or other drugs tend to have more accidents, which may increase their employers' insurance costs. Addicts are also more likely to steal money or property from the employer or from co-workers in order to support their habits.

In order to ensure a drug-free workplace, some employers have resorted to testing their workers for drug and alcohol use. About 25 percent of the Fortune 500 firms now do some testing of employees, as compared with 10 percent in 1982.[22] As of mid-1986 nine Federal agencies had drug-testing programs in place, and at least eight were planning to begin testing in the immediate future.[23] An Executive Order of September 1986 established a "drug free workplace" as the policy of the U.S. Government.

A number of firms that have instituted drug-testing programs have reported dramatic decreases in on-the-job accidents and injuries—90 percent in the case of Georgia Power and 70 percent at the Southern Pacific Railway.[24] However, there are some who dispute that testing is responsible for these results; for example, in the case of Georgia Power, the accident rate began its decline before testing started.[25] In addition, the tests have also led to charges that they are invasive of privacy, that tests are sometimes inaccurate, and that testing programs are sometimes used to intimidate, discriminate against, or harass certain groups of workers.

Public concern with the substance-abuse problem, on the one hand, and concern about the advisability of on-the-job drug testing, on the other, reached a head in 1986. In March of that year, the President's Commission on Organized Crime recommended that Federal employees and contractors be subjected to "suitable" drug testing as an essential step in reducing the demand for drugs. Several months later, President Reagan held "voluntary" testing for the White House staff and suggested that government agencies and private industry follow suit. Executive Order 12564 of September 1986 directed the Office of Personnel Management to develop governmentwide guidelines on testing. Objections to widespread use of testing have been voiced in the press and in a report by subcommittees of the House Committee on Civil Service.[26]

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[18] William E. Hartsfield, "Polygraphs," *Labor Law Journal*, vol. 36, November 1985, pp. 817-834.

[19] Research Triangle Institute, *Economic Costs to Society of Alcohol and Drug Abuse and Mental Illness*, Research Triangle Park, 1984. The continuations of this trend is supported by statistics of the National Institute of Drug Abuse.

[20] Ibid.

[21] Susan Denzler, et al., "Can You Pass the Job Test?" *Newsweek*, May 5, 1986, pp. 46-53.

[22] Mark A Rothstein, —ning Workers for Drugs: A Legal and Ethical Framework," *Employee Relations Law Journal*, winter 1985/1986, pp. 422-437.

[23] U.S. Congress, House Committee on Post Office and Civil Service, Subcommittee on Civil Service, "Drug Testing in the Federal Government," Staff Report, June 20, 1986, pp. 7-10.

[24] Stephen R. Dujack, "An Unhealthy Specimen: Drug Tests Are Unconstitutional and Sometimes Wrong," *Washington Post*, Aug. 17, 1986.

[25] Testimony of Ms. Leslie Price before the Subcommittee on Human Resources, House Committee on Post Office and Civil Service, Sept. 16, 1986.

[26] U.S. Congress, House Committee on Post Office and Civil Service, Subcommittee on Human Resources, "Drug Testing Federal Employees," Hearings, Mar. 18, 1986, Serial No. 99-46; Subcommittee on Civil Service, "Drug Testing in the Federal Government," Staff Report, June 20, 1986.

Drug testing is rapidly growing into a multimillion-dollar industry. Total sales of urine test kits in 1986 were estimated at $115 million worldwide and $80 million in the United States, and some expect sales to double by 1990. Of the $73 million total test kit sales in 1985, only about 12 million dollars' worth were purchased by hospital labs (where primary use is to monitor levels of medication prescribed by physicians). About 20 million dollars' worth of test kits were purchased by the Department of Defense, $10 million by employers for onsite screening, and $22 million by commercial laboratories, which primarily do testing for employers.[27] In response to the booming market, many firms that have heretofore specialized in diagnostic tests for hospitals are hurrying to introduce kits for identifying drug abusers in the workplace.

In addition to manufacturing the reagents and test kits, several of the largest test manufacturers are also in the consulting business, helping their clients set up drug test programs and cope with the personnel and legal problems associated with drug testing. For example, Diagnostic Dimensions —a joint venture of test manufacturer Hoffman-LaRoche and Development Dimensions International, a management training company—helps employers to implement testing programs and to fight legal challenges by employees. Similar service is offered by Psychiatric Diagnostic Laboratories of America.[28]

Technological Considerations

Tests for use of drugs such as marijuana, cocaine, heroin, or amphetamines have relied on chemical analysis of urine or blood specimens. Typically, in the employment context, urinalysis is used. This requires taking the sample from an employee under conditions that satisfy "chain of custody" requirements (i.e., treating each urine specimen as though the results may be introduced in court). Careful security and labeling procedures must be maintained in sending the specimen to a laboratory, performing chemical tests on the specimen (and often a second "corroborating" test), and then returning the test results to the employer.

Among the more widely used tests are EMIT (Enzyme Multiplied Immunoassay Technique), manufactured by the Syva Co., and the ABUSCREEN system, manufactured by LaRoche Diagnostics, Inc. Both these tests are based on immunoassay techniques, are fairly low in cost ($13 to $15 per test), and are generally used for mass screening of large batches of samples. Tests using the gas chromatography (GC) or gas chromatography/mass spectrometry (GC/MS) techniques are more accurate, require more highly trained technicians, cost more ($60 to $80 per sample), and are usually used to confirm any positive results (finding the evidence of drug use) from a screening test.

One major problem with these tests is that they do not measure the current level of intoxication, but rather the levels of chemical byproducts created as the body metabolizes the drug. Thus, the tests can only show that some drug has been used but do not show that a person is currently impaired.

Other problems relate to the accuracy of the tests themselves and the ability of commercial labs to provide accurate results on a regular basis. Although manufacturers and proponents of screening tests claim accuracy rates of 95 to 99 percent, other researchers have found accuracy to be much lower in typical commercial laboratories. Inaccurate results can arise from poor laboratory procedure or from mislabeling or mishandling of specimens en route to the lab. In 1984 the Air Force had to reinstate 6,500 airmen dismissed for drug use because their tests were invalidated by poor lab procedures and improper "chain of custody" procedures for handling specimens.

Proficiency tests of laboratories have revealed that many have high error rates.[29] According to some experts, competition for drug testing contracts has lead many to cut prices and overwork their technicians and equipment, thus pushing error rates even higher.[30] There are no mechanisms to put incompetent labs out of business. Even the few States with regulations and proficiency standards do not have manpower to enforce their regulations. Federal regulations affect only labs that test specimens sent across State lines, and these regulations are hard to enforce.[31]

A number of other substances, including prescription and over-the-counter drugs, herbal teas, and culinary poppy seeds can be mistaken for drugs in some of the tests. A controversial set of studies has found that tests can mistake melanin (the substance responsible for skin color as well as other functions of the body) for a byproduct of THC (the active ingredient of marijuana), thus producing higher false positive rates among black people.[32] There is also controversy over the cutoff points to be used for tests. While some experts suggest that tests for marijuana should be considered positive only if they have a concentration of over 50 nanograms per milliliter (ng/ml) a more typically used cutoff point is 20 ng/ml and some organizations use even lower cutoff points. Inaccuracies in all tests are much more likely at low concentrations.[33] Even the use of confirmatory tests has not stilled controversy about accuracy, especially since some commercial labs rely on lower cost tests for confirmation as well as screening.[34]

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[27] Calvin Sims, "Boom in Drug Tests Expected," *New York Times*, Sept. 8, 1986, pp. D1, D21.

[28] Fern Schumer Chapman, "The Rukus Over Medical Testing," *Fortune*, Aug. 19, 1985.

[29] See for example Hugh J. Hansen, Samuel P. Candill, and D. Joe Boon, "Crisis in Drug Testing," *JAMA*, Apr. 26, 1985.

[30] Lawrence K. Altman, "Drug Tests Gain Precision But Can Be Inaccurate," *New York Times*, Sept. 16, 1986.

[31] Walt Bogdanich, "False Negative: Medical Labs, Trusted as Largely Error Free, Are Far From Infallible," *Wall Street Journal*.

Ethical and Legal Issues

Privacy.—There are several reasons why employees have objected to drug testing on privacy grounds. For one thing, it can reveal details of personal life outside of work. Current methods of drug screening reveal recent use of a drug, not current impairment; people who use drugs outside of work test positive, even though they might be sober and fit for duty during work hours. Is after-hours use of legal or illegal drugs an employer's concern?

In addition, producing a urine sample before witnesses violates most people's reasonable expectation of privacy for bodily functions. Both these objections apply to deficiencies of urinalysis, not to the concept of drug testing in general.

Methods and Conditions of Testing.—The first question is whether testing is the appropriate response to perceived drug use in workplaces. In many populations a testing program may cast too broad a net, subjecting many workers to testing in order to identify a very few drug users. The next question is who should be tested? Should all employees be tested or only those with jobs that pose special problems of safety or security if there is drug abuse? If only some employees are tested, does this create equal protection problems if those tested are disproportionately racial minorities or blue collar workers? What drugs should be tested for? Is it an employer's job to identify only users of illegal drugs? Many legal drugs are also abused. On the other hand, some employees that are using a legal drug for legitimate medical reasons may be impaired using it.

Is there a socially acceptable need for an employer to mandate periodic or random substance-abuse testing for the workforce, or should testing be limited to specific instances where an employee's conduct raises "reasonable suspicion" of substance abuse? Random or periodic testing seems contrary to the principle that people are innocent until proven guilty; such a testing scheme requires everyone to prove his or her innocence on a regular basis. In a number of cases to date, the courts have required that employees be tested only when there is reasonable suspicion of drug use. Random testing of Iowa prison guards and compulsory testing of New York City teachers applying for tenure were struck down by the courts.[35] In both cases, however, the employers were government entities, whose employees are protected by the Fourth Amendment to the Constitution against "unreasonable search by their employer." A number of private employers make use of random testing, and some of their programs are also being challenged.

Another important point is what drugs should be covered by the tests. A survey of drug testing programs in the Federal Government found wide variation in the types of drugs being screened.[36] While many employers focus on illegal substances like cocaine and marijuana, a number of legal substances are also abused. However, testing for these drugs will also reveal their use by individuals who use them legitimately, thus raising another privacy issue.

One interesting point is the lack of interest of many employers at the present time in testing for alcohol abuse in the workplace, despite all the evidence that alcohol is responsible for far more workplace accidents and absenteeism than the illegal drugs. (Alcohol intoxication is usually tested by breath or blood tests, rather than urinalysis.)

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[32] James Woodford, Ph.D., personal communication Aug. 25, 1986, based on studies conducted at the U.S. Army Forensic Lab, Wiesbaden, Germany. See also "The Melanin Defense, Debated by Woodford and McBay," *Substance Abuse Report*, Dec. 1, 1986, p. 3.

[33] "The Melanin Defense, Debated by Woodford and McBay," *Substance Abuse Report*, Dec. 1, 1986, p. 3.

[34] Table on "Modified Drug Screen" from conference material produced by SmithKline Clinical Laboratory, Memphis, TN.

[35] For example, cases of New York City teachers, New Jersey government workers, Jesus Rangel, "Government Bars Drug Testing of Teachers," *New York Times*, Aug. 12, 1986, p. B1; Alfonso A. Narvaex, "U.S. Judge Blocks Urine Drug Tests," *New York Times*, Sept. 19, 1986, p. A1.

[36] See U.S. Congress, House Committee on Post Office and Civil Service, Subcommittee on Civil Service, "Drug Testing in the Federal Government," Staff Report, June 20, 1986, pp. 7-10; also Lawrence Miike, "Accuracy and Reliability of Urine Drug Tests," in House Committee on Post Office and Civil Service, Subcommittee on Human Resources, Hearings of Sept. 16, 1986.

Use of Test Results

Another question germane to any testing program is what to do with the drug abusers when they are discovered. In the case of pre-employment screening, the answer of most firms is not to hire them, although a few do tell the applicants why they have been turned down and invite them to reapply once they are drug free.

In some firms, a current employee who tests "positive" might be referred to an employee assistance program (EAP) for rehabilitation. Some observers have expressed concern that existing EAPs, which heretofore have assisted employees who voluntarily sought help for drug problems, will be severely weakened by an influx of clients who have been "sentenced" to rehabilitation after a positive urine test. An alternative followed by many clients is the dismissal or discipline of drug users. Between 1971 and 1980 the Armed Forces tended to rehabilitate returning Vietnam veterans whose drug problems were detected through urinalysis. In recent years, however, the emphasis has turned to discipline and dismissal. The current guidelines issued by the Office of Personnel Management for Federal agency drug programs directs each agency plan to include an EAP, but also lists disciplinary actions including reprimands, suspension, and dismissal. According to the guidelines, dismissal from Federal service would be mandatory upon a second confirmed finding.[37]

A forthcoming OTA technical memorandum will look in greater detail at some of the technical, administrative, and legal problems involved in drug testing.[38]

Genetic Screening

Extent and Rationale for Genetic Testing

Genetic screening is not new, though in many ways it is still an emerging technology. Tests for diagnosing or predicting some genetically based diseases have been available for some time. For example, screening tests for sickle cell trait, a condition especially common among those of African ancestry, were available in the early 1970s. Blood tests of newborns to screen for phenylketonuria (PKU), a genetic ailment that causes mental retardation and death if not treated early, is called for in statutes or regulations of 46 States and is customary in the others.[39]

Genetic screening in the workplace is not yet a widespread practice. In its 1983 report on genetic screening in the workplace, OTA found that few large U.S. firms were using genetic screening in their personnel selection practices.[40] Out of 366 respondents, only 8 said they were currently doing any type of genetic test; 17 had done so in the past; but 59 had plans to do so in the future. While these results indicate that genetic screening in the workplace was not widespread at the time, many researchers in the field assert that it is difficult to get good information about firms that do genetic studies. Such firms may not answer questionnaires or talk about their policies because of the controversies, including charges of discrimination, that have arisen when other firms have publicly discussed screening programs.[41]

Despite the bad publicity that might attach itself to the concept of genetic testing, screening might offer some advantages to employers. It is known that human beings have varying susceptibilities to illness, including illnesses related to exposure to toxic substances at work. Not everyone who mines coal gets black lung disease, for example, just as not everyone who smokes cigarettes gets cancer. If firms could determine that certain people are especially susceptible to a toxin found in the workplace they could decline to hire them or otherwise avoid assigning them to work near the hazardous substance. Thus the employer helps the employee stay healthy while also avoiding the possible costs of a future illness that the employer might have to bear. Employers often pay part or all of their employees health or life insurance costs. Group insurance rates depend on the health experience of the group. Thus it would be to an employer's advantage to identify and eliminate unhealthy or potentially unhealthy employees in order to keep rates low.

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[37] Office of Personnel Management, FPM Letter 792-, "Establishing a Drug-Free Federal Workplace," Dec. 27, 1986.

[38] Office of Technology Assessment, *Urine Drug Testing*, Technical Memorandum (forthcoming 1987).

[39] American Bar Foundation, *State Laws and Regulations Governing Newlorn Screening*, compiled by Lori B. Andrews, Chicago, 1985.

[40] U.S. Congress, Office of Technology Assessment, *The Role of Genetic Testing in the Prevention of Occupational Disease*, OTA-BA-194 (Washington, DC: U.S. Government Printing Office, April 1983).

[41] Interview with Elaine Draper, Ph.D., School of Public Health, University of California, Berkeley, September 1986. See also Thomas H. Murray, "The Social Context of Workplace Screening," *The Hastings Center Report*, October 1984.

Technological Considerations

Although genetic screening might appear to be beneficial to both the employer and the employee, it is controversial for a number of reasons. The validity and accuracy of most screening tests has not yet been firmly established. Even if a person is determined to have a particular genetic trait, he or she may not necessarily develop an illness; and others may develop a disease even though tests do not show them to have the genetic markers usually associated with a trait. Because genetic susceptibilities are unequally distributed among different races or ethnic groups, screening programs can have the flavor of illegal discrimination. In addition, individuals may prefer to assume their own risks in deciding what kind of work to do. Finally, some argue that the way to ensure workplace health is not to exclude hypersusceptible workers, but to design safe ways to handle toxins so that no workers are exposed to them. Thus, genetic screening may offer employers a way to evade responsibility for designing safe workplaces.

New techniques based on recombinant DNA research show promise of allowing scientists to develop better tests, including tests to detect some people at risk for common ailments such as diabetes, heart disease, and manic-depressive illness. Further research is likely to gradually develop tests that are more sensitive, more specific, and more reliable. A forthcoming OTA background paper will look more closely at the technical feasibility and commercial potential of new genetic tests.[42]

The possibility of tests for common diseases only intensifies the controversy about the possible uses of screening in the workplace. If employers could justify these tests as a valid form of pre-employment testing, they could be applied to a larger population of workers, not just those who work with hazardous materials. Possible advantages to employers could be fewer workers' compensation claims, lower insurance premiums, and perhaps, less lost time and wages due to illness.

A related question is how insurance companies will use the results of genetic testing. If really good tests for susceptibility to common ailments become available, their results might be used to raise the price of coverage or to deny coverage to certain groups.

Legal and Ethical Concerns

A number of experts in the area have worried that extensive use of genetic screening in the workplace could create different classes of workers based on genetic fitness or unfitness. One researcher noted that people whose tests show a likelihood of developing a disabling disease might be denied employment or training opportunities in certain professions. Airlines, for example, might prefer to hire pilots who are likely to have a long career, in order to justify the long training; no one wants pilots who are likely to have early heart attacks.[43] The opposite type of discrimination might develop in jobs where training is cheap but pensions are expensive; short-lived people might be preferred for routine jobs.

Even putting aside the question of employment discrimination, a number of other privacy issues arise, particularly regarding the question of access to test results. While tests may be performed by a company's medical personnel, the records may circulate within firms to nonmedical personnel who make management decisions about the worker. A confidential physician-patient relationship usually does not exist in the workplace. This aspect of privacy, which would apply to any kind of medical test, is even more sensitive in this case because decisions may be made on the basis of the future possibility of disease, rather than actual illness. There is also the possibility of stigmatization and diminution of future job prospects because test performed by one employer could become part of the public record, perhaps through workers compensation records or employment clearinghouses. Medical records are sometimes subject to inspection by third parties as well—unions, government agencies, insurance companies, epidemiologists doing research, etc.

That these concerns actually could become a problem seems to be indicated by the current response of employers and insurers to acquired immunodeficiency syndrome (AIDS). The situation with AIDS is not exactly analogous because AIDS is not a genetic disease, and is also a very frightening and fatal ailment that is widely misunderstood. Employers have dismissed workers who showed symptoms such as sudden weight loss, which might be indicative of AIDS. They have also required employees and job applicants to take the currently available AIDS test. In a sense this is a predictive test because it only reveals the presence of an antibody, not the disease itself. Some people have lost their jobs because they tested positive. In addition, insurance companies have used these tests to screen applicants for insurance coverage, and some have withdrawn from the market in areas where such screening is forbidden by law.

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[42] U.S. Congress, Office of Technology Assessment, Applications of Biotechnology ot test for Human Genetic Disorders, forthcoming (1987).

[43] Harold M Schmeck, Jr., "Advances in Genetic Forecasts Increase Concerns," *New York Times*, Aug. 19, 1986, quoting Dr. Kenneth Paigen, University of California, Berkeley.

Brain Wave Research

State of the Technology

Brain activity that underlies psychological processes can be recorded from the surface of the head and body in the form of weak electrical and magnetic signals, or "brain waves" as they will be called in this section. Many of these signals are not well understood by scientists despite decades of research. However, some are known to reflect cognitive (memory, language, learning) or sensory (vision, hearing, touch) processes stimulated by external stimuli. These signals, often called "event-related brain potentials" or ERPs, are extremely weak (typically on the order of a few microvolts, or millionths of a volt), but they can be monitored through sensors attached along particular regions of the scalp.[44] Magnetic recordings of brain activity are also possible by using a specialized magnetic detector termed SQUID (superconducting quantum interference device).

Research on electrical and magnetic recordings of human brain activity is being conducted in a number of government, government-supported, and academic laboratories. Government funding for research is provided by a variety of Federal agencies, including the National Institutes of Health, the National Science Foundation, and the Department of Defense.

Five areas of focus characterize much of the current research:

1. assessment of neurological function and neurological disorders;
2. assessment of mental disorders;
3. analysis of normal cognitive processes, including perception, memory, language, and decisionmaking;
4. analysis of cognitive disorders; and
5. human factors applications.

Table 24 shows some of the recent research in this area.

The potential benefits to society appear to be in several main areas—as a tool for medical diagnostics and cures, for developing optimal learning and educational techniques, and for enhancing man-machine interfaces. This technology is already in use as an aid to diagnosing brain tumors, multiple sclerosis, dyslexia, epilepsy, and strokes. It has also been used to test for mental retardation, coma, and autism.[45]

Table 24.—Examples of Research on Brain Waves

Research center	Areas of investigation
National Institutes of Mental Health	Predict risk of psychiatric disorders; tendency toward behavioral problems (sbstance abuse, antisocial personalities).
University of California La Jolla, CA (ONR, NIMH, NSF funds)	Analysis of sensory and cognitive processes diagnosis, e.g., deafness. Man-machine interface: Analysis of mental workload, e.g., attention and concentration
Veterans Administration Medical Center Westhaven, CT	Detect neurological disorders, multiple sclerosis and make more precise neurological diagnoses. Understanding brain structures and processes responsible for surface electrical activity.
University of Illinois Champagne-Urbana, IL	Cognitive processes, e.g., memory, learning, decision-making. Man-machine interface
Harvard Medical School Boston, MA	Brain electrical activity mapping for detecting mental disorders, e.g., dyslexia, Alzheimer's disease
Advanced Research and Development, Inc. Columbia, MD (NASA funds)	Man-machine interfaces, e.g., aircraft pilots
Air Force Aerospace Medical Research Lab Dayton, OH	Man-machine interfaces; analysis of mental workload
University of Florida at Gainesvile (CIA funds)	Lie detector test (ended 1986)

SOURCE: Office of Technology Assessment, 1987.

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[44] Cognitive processes are identifiable through ERPs that occur between about 100 and 700 thousandths of a second or more following each stimulus; sensory processes are reflected in ERPs that occur within 100 thousandths of a second following the stimulus.

[45] Carol Truxal, "Watching the Brain at Work," *IEEE Spectrum*, Marc, 1983, pp. 52-57.

Workplace Testing Applications

The examples above of brain wave research at least raise the possibility that brain wave analysis could lead to usable technologies with possible applications in the workplace. If developed as practical systems, they could be used to gather extensive information about a subject's psychological state, genetic propensities, or honesty; they might be useful in new means of measuring or pacing work.

Some predictive tests that might be of interest in the area of work monitoring or worker testing could be derived from the above avenues of research. These could include the following:

- predicting whether a person is at risk of certain diseases, such as Alzheimer's disease or alcoholism;
- determining whether a person is concentrating and predicting the speed of mental response to stimuli;
- determining recognition of persons, places, and objects;
- testing for knowledge of a specific subject;
- detecting lies.

Brain waves are also being explored as a possible means of improving man-machine interfaces. Future systems are envisioned that would monitor the operator's ability to cope with information flows and to make decisions. On the basis of the information about his performance, the system could either adjust the rate of information flow to the operator or automatically take on some of the operator's tasks to optimize his performance. Some future applications could include pilots, air traffic controllers, and other computer-based work.

If practical brain wave systems could be developed, the implications for privacy would be tremendous. In the case of workload measurement, for example, the distinction between monitoring the work and monitoring the worker completely disappears. In the case of something like an improved lie detector, such technology might actually give the ability to "read the mind," removing all possibility of a person's keeping information private.

Whether practical systems can be developed, however, is another question. There are serious limitations on our understanding of brain waves, and at least one researcher worries about the "polygraphization" of brain wave research.[46] By this he refers to commercial applications of scientific discoveries before the underlying principles are thoroughly understood:

> Polygraphization occurs when the commercial development is done without an anchor in the scientific community. Actions are taken to assure the profitability of the product, and caution and control become less critical . . . I emphasize that all this is done well within the law. But, it remains the case that it is quite possible to have what appears to be an impressive instrument that is essentially worthless.[47]

The danger of using such a device in the workplace, of course, is that decisions affecting people's lives will be made based on flawed technology or flawed principles. Due to the complexity of the nervous system, it is likely that only very general links will be drawn between physiological processes like brain waves, and psychological ones like lying or concentration. Even these tests may only be valid in a very structured environment, such as in a controlled laboratory setting. A workplace setting would introduce too many uncontrollable variables.

Other researchers, however, are more optimistic about the possibility of developing practical systems. Researchers at Westinghouse Research & Development Center have, for a number of years, been exploring the use of brain waves, in particular a wave called the P300, to determine an individual's level of attention and cognitive processing. A Westinghouse researcher has predicted that within the next 10 years, Westinghouse could market "a complete system capable of monitoring the mental processing effort of employees as they worked."[48]

In a slightly different direction, a system for using brain wave analysis for determining whether a person is intoxicated on alcohol or drugs is already on the market. Called the Veritas 100 Analyzer, it is marketed by National Patent Analytical Systems. The Analyzer is small, about the size of a personal computer, and is designed to be used at the workplace. A disposable headband is placed on the subject's head, and the analyzer examines the corneal-retinal potential transmitted along the vestibular nerve. According to the manufacturer, the system recognizes the characteristic brain waves that this nerve group produces when the subject is under the influence of particular substances. The signal is unique because each drug produces a specific "fingerprint," a waveform known as a "drug-evoked potential," according to the inventor.[49] Results of the test are available within a few minutes. The analyzer shows a report on the screen and also prints out a report and stores a record of the test.

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[46] Emanuel Donchin, *Psychophysiological Monitoring: Possibilities and Prospects*, contractor report prepared for OTA, September 1986. Also, Dr. Charles Wood, Department of Neuropsychology, VA Medical Center, Westhaven, CT, and Dr. Steve Hillyard, Department of Neuroscience, University of California at La Jolla, concurred with this view in telephone interviews with OTA staff, September 1986.

[47] Emanuel Donchin, *Psychophysiological Monitoring: Possibilities and Prospects*, contractor report prepared for OTA, September 1986.

[48] Michael Schrage, "Technology Could Let Bosses Read Minds," *Washington Post*, June 3, 1984, p. C1.

The manufacturer claims accuracy in the 99 percent range. The device is currently undergoing independent testing, but the results were not available to OTA at this writing. The Veritas Analyzer has already been used by several police departments and in some workplaces.

Conclusion

While somewhat different issues are raised by each type of employee testing discussed above, there are some common themes. In general, testing pits the interests of the employer in reducing costs, increasing workplace safety, limiting liability and exercising managerial control against employee interests in maintaining personal dignity and privacy. Some of the legal questions involved in testing are discussed in chapter 4 of this report. In addition, listed below are some OTA analyses dealing in detail with the topics of polygraph testing, drug screening, genetic screening, and with the constitutional issues involved in workplace testing:

- *Review of Defense Department's Polygraph Test and Research Programs—Health Staff Paper* (March 1987);
- *Tests for Human Genetic Disorders* (forthcoming, 1988);
- *Urine Drug Tests—Health Testimony* (June 10, 1987);
- *Science, Technology, and the Constitution* (forthcoming, 1988).

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[49] S. Thomas Westerman, et al., "Qualitative Measurement of Drugs," *Laryngoscope*, vol. 94, No. 2, February 1984.

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